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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.

* * * * * * * * *

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.

* * * * * * * * *

The original report was prepared by the Wolf Management Engineering Company, Chicago, Illinois.

* * * * * * * * *

This manual has been revised and rewritten by
George H. Andrews Engineering Associates, Inc.
411 Southern Building, Washington 5, D. C.

PR -11

May 1959

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The author gratefully acknowledges the cooperation and technical information provided as well as the review of this manual by

Mr. H. D. Wells, President
Apmew Incorporated
Post Office Box 1
300 Bay Street
Glens Falls, New York

While this manual includes all new machinery and equipment, good, used, rebuilt paper machinery is available in the United States market.

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PLANT REQUIREMENTS FOR MANUFACTURE OF COARSE WRAPPING PAPER

INTRODUCTION

The purpose of this manual is to present basic information for establishing and operating a small coarse wrapping paper mill in a foreign country.

The plant is designed to produce one-ton of coarse wrapping paper per hour. The plant may be operated as many hours per day as desired, since no difficulties are presented in closing down and starting up the operations. Only about 15 minutes preparation is required to start production and only about five minutes preparation is required to stop production.

Based on current practice, in the United States, this is a small plant. The recommended equipment and production methods are modern and have proven profitable when operated under conditions comparable to those assumed.

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

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

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

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

6. The plant operation is based on 24 hours per day, five days a week, and fifty weeks per year. However, the plant may be operated any desired number of hours per day.

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, 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.

PRODUCT SPECIFICATIONS

All information and figures contained in this manual are based on the production of a 30-pound coarse wrapping paper to be sold in various widths and sizes of rolls.

MANUFACTURING UNIT

The unit used in the manufacture and sale of coarse wrapping paper is one-ton.

DIRECT MATERIALS

This manual is based on the use of wood to produce the pulp required for the production of coarse wrapping paper. A partial list of both coniferous and broad leaf woods that are suitable for producing pulp for the manufacturing of paper are listed on page three, together with a general average of the wood fiber length of each species.

Coniferous Woods		Millimeters
Jack Pine	(Pinus divaricata)	3.50
White Pine	(Pinus strobus)	3.30
Red Pine	(Pinus resinosa)	3.20
White Spruce	(Picea canadensis)	3.10
Black Spruce	(Picea mariana)	3.00
Balsam Fir	(Abies grandis)	3.00
Hemlock	(Tauga canadensis)	2.90
Sitka Spruce	(Picea sitchensis)	3.50
Engelmann Spruce	(Picea engelmanni)	3.00
Grand Fir	(Abies grandis)	3.20
White Fir	(Abies concolor)	3.50
Douglas Fir	(Pacudotsuga taxifolia)	4.50
Western Hemlock	(Tauga heterophylla)	2.80
Tamarack	(Larix laricisa)	2.80
Western Larch	(Larix occidentalis)	2.70
Longleaf Pine	(Pinus palus tris)	3.70
Loblolly Pine	(Pinus taeda)	3.00
Shortleaf Pine	(Pinus achinata)	3.70
Lodgepole Pine	(Pinus murrayana)	3.20
Western Yellow Pine	(Pinus ponderosa)	3.60
Bald Cypress	(Taxodium distichum)	3.30
Redwood	(Sequois sempervirens)	5.50

Broad Leaf Woods		
Elm	(Ulmus americana)	1.50
Yellow Birch	(Betula luten)	1.50
Cottonwood	(Poplar) (Populas deltoiden)	1.30
White Ash	(Fraxinus americana)	1.20
Paper Birch	(Betula papyrifera)	1.20
Basswood	(Tilia americana)	1.15
Chestnut	(Castanea dentata)	1.00
Maple	(Acer saccharum)	1.00
Tulip Tree	(Liriodendron tulipifere)	1.80
Cucumber Tree	(Magnolia acummata)	1.30
Black Gum	(Nyssa sylvatica)	1.70
Red Gum	(Liquidambar styraciflua	1.60
Sycamore	(Platanus occidentalis)	1.70
Aspen	(Popular) (Populus tremuloides)	1.15

The cost of pulp wood per ton of paper will vary in accordance with the availability of the wood and local freight rates. For the purpose of this manual the average cost of pulp per ton will be used. Experience has shown that the average cost of pulp wood per ton of coarse wrapping paper is $27.00.

The cost of chemicals used including caustic soda, corn starch or rosin, and alum is estimated at $23.00 per ton of paper. The total cost of direct materials is estimated at $50.00 per ton. On this basis the annual cost of direct materials would amount to $300,000.

MANUFACTURING OPERATIONS

The wood should be purchased with the bark removed if possible, if this is not possible it must be removed at the plant.

Two men are required in the yard to place the wood in the shaving hoppers. A blower system connected with the shaving hoppers blows the shavings into a pile over a conveyor leading to the combined hammer mill and screen. The yard men operate the conveyor to move the shavings to the combined hammer mill and screen as required.

The hammer mill breaks up the material to a fineness that permits it to pass through the classifying screen directly into beater which is located below the screen.

A water content of approximately 96 per cent is maintained in the beater and about one to two per cent of caustic soda is added depending on the kind of pulp wood used.

The pulp is pumped from the beater to the recovery thickeners where about 11 per cent of the liquid is removed. The liquid removed is returned to the beater.

The pulp is then drawn off by gravity into the digester or pulp refiner where the pulp is cooked. The digester is of special design which generates about 50 per cent of the heat required and at the same time separates and brooms the fibers which increases the quality and strength of the finished paper and reduces the cost of chemicals required. This operation is automatic and does not require a chemist or highly skilled operator.

The pulp is then moved by gravity to the thin stock pump where water is added to bring the fiber to about one per cent consistency while the pulp is passing to the screen. The screen plates used depend upon the kind of wood fibers used and the kind of finished product desired. Because of design of the centrifugal fiber cleaning machine and screen, the dirt is swirled outward away from the screen plate while the fibers flow toward the center of the screen thereby securing a longer fiber.

The rejected oversized materials flow by gravity back to the beater thereby eliminating material waste and increasing the yield of finished paper.

The screened pulp is then moved by gravity and washed twice in two cylinders. The first washing cylinder removes the pitch liquid. The second washing cylinder completes the washing operation.

The pulp is then moved by gravity to the storage chest. At this stage the unbleached pulp contains about five per cent fiber and is rapidly circulated and agitated to maintain uniformity.

The pulp is then pumped to a beater where the paper furnish is made. This includes adding size usually corn starch or rosin for adhesion purposes and alum for rapid setting.

From the beater the pulp is pumped to the Jordon or refining machine from where it flows out onto the continuous wire cloth of the Fourdrinier machine. The Fourdrinier passes the pulp into felts which convey it into press rolls where much of the water is pressed out. The water pressed out is returned to the beater for reuse. The pulp now in sheets then passes through a set of steam heated drying rolls to the calender stack where rollers smooth out the paper and give it a glossy finish.

From the calender stack the paper passes to a reel where it is reeled into large rolls of finished paper.

The completed rolls are removed from the reels and placed into a rewind machine which rerolls the paper. The rolls are then cut into desired width in accordance with customers orders ready for delivery.

Large rolls are bound at both ends with steel tape. Small rolls are either taped or paper wrapped.

* * * * * * * *

DIRECT LABOR

Occupation	Number Required	Hourly Rate	Estimated Annual Cost	Actual Cost
Yard men	2	$ 1.50	$ 6,000	_____
Wet machines	2	1.80	7,200	_____
Paper machine tender	1	2.00	4,000	_____
Back tender	1	1.80	3,600	_____
Reel winder	2	1.60	6,400	_____
Total per shift	8		$27,200	_____
Total for three shifts	24		$81,600	_____

INDIRECT LABOR

Occupation	Number Required	Hourly Rate	Estimated Annual Cost	Actual Cost
Manager	1		$10,000	_____
Foreman	2		12,000	_____
Bookkeeper	1		5,000	_____
Maintenance	1	$ 2.00	4,000	_____
Truck driver	1	1.50	3,000	_____
Receiving and shipping	1	1.60	3,200	_____
Total	6		$37,200	_____

PRODUCTION TOOLS AND EQUIPMENT

Description	Number Required	Estimated Cost	Actual Cost
Wood shaver	1	$ 8,070	
Hammermill and screen	1	4,082	
Double quick pulper	2	39,900	
Centrifugal pumps 6"	4	8,752	
Screw press	1	4,906	
Digester pulp refiner	1	14,662	
Centrifugal pump 6"	1	2,188	
Pulp screen	1	7,894	
Pulp washer thickener	1	11,970	
Consistency regulators	2	3,580	
Chemical meter	1	700	
Storage tank	1	5,800	
Agitator	1	2,546	
Centrifugal pump 6"	1	2,404	
Wet pulp machine 84"	1	26,000	
Hydrabrushing Jordon	1	7,985	
Storage tank	1	5,985	
Metering stuff box	1	6,787	
Mixing pump 8"	1	1,913	
Save all	1	11,970	
Paper machine complete including Fourdrinier, press, dryer, calender stack, reel, and winder and slitter		503,000	
Boiler, 300 hp., 125 p.s.i.		83,000	
Starters, valves, piping, and 10 per cent spare parts		112,600	
Total		$ 873,694	

OTHER TOOLS AND EQUIPMENT

Description	Estimated Cost	Actual Cost
Welding equipment	$ 400	_____
Compressor	800	_____
Hand tools	500	_____
Steel taping equipment	300	_____
Floor crane	1,000	_____
Truck, delivery	4,000	_____
Total	$ 7,000	_____

FURNITURE AND FIXTURES

Description	Number Required	Estimated Unit Cost	Estimated Total Cost	Actual Cost
Desks and chairs	2	$ 125	$ 250	_____
File cabinets	2	75	150	_____
Typewriter	1	150	150	_____
Adding Machine	1	150	150	_____
Total			$ 700	_____

SUPPLIES

Item	Estimated Cost	Actual Cost
Lubricants	$ 300	_____
Welding rods	200	_____
Welding gas	300	_____
Maintenance materials and spare parts	2,000	_____
Hand tools	200	_____
Office supplies	200	_____
Gas, oil and maintenance for truck	500	_____
Steel strapping	300	_____
Total	$ 4,000	_____

PLANT LAYOUT

A plant layout is shown on pages 27 and 28. The pulp machinery will be located back of the Fourdrinier machine. The part of the building containing the pulp machinery and equipment will include a basement in order to provide gravity feed of materials for several operations.

PLANT SITE

In order to provide yard space for pulp wood as well as space for future expansion about two acres of land will be required. The site should be as advantageously located as possible with respect to transportation facilities, power, water, fuel, sources of labor and markets. The estimated cost of the plant site is $2,000.

BUILDING

The building should be 60 feet wide by 150 feet long and high enough to permit the use of a floor operated crane. A basement will be required under the part of the building that houses the pulping equipment. The building frame should be of steel to support a crane. The walls may be constructed of any suitable local materials.

The cost of the building including the crane, the basement and foundations for the equipment is estimated at $5.00 per square foot or about $45,000.

POWER

It is assumed that a dependable supply of electric power will be available from public power service lines. The total connected load will be about 500 horsepower. Based on this connected load the cost of power is estimated at about $15,000 per year.

WATER

About 2,000 gallons of water is used per minute. However, much of the water is returned and reused. The plant should be located near a river or lake if possible where the only cost of water will be the pumping cost. The annual cost of water is estimated at $3,000.

FUEL

The cost of steam requirements is estimated at $12,000 annually. Consideration should be given to the use of suitable local fuel in determining the design of the boiler to be purchased.

TRUCK

A five-ton truck will be required for delivery purposes. The cost of the truck is estimated at $4,000.

DEPRECIATION

Item	Estimated Cost	Years Life	Estimated Per Year	Actual Per Year
Building	$ 45,000	20	$ 2,250	_____
Production tools and equipment	873,694	10	87,369	_____
Other tools and equipment	3,000	10	300	_____
Furniture and fixtures	700	10	70	_____
Truck	4,000	4	1,000	_____
Total			$ 90,989	_____

MANUFACTURING OVERHEAD

Item	Estimated Cost	Actual Cost
Depreciation	$ 90,989	_____
Indirect labor	37,200	_____
Power	15,000	_____
Water	3,000	_____
Fuel	12,000	_____
Supplies	4,000	_____
Total	$ 162,189	_____

MANUFACTURING COST

Item	Estimated Cost	Actual Cost
Direct materials	$ 300,000	_____
Direct labor	81,600	_____
Manufacturing overhead	162,189	_____
Total	$ 543,789	_____

FIXED ASSETS

Item	Estimated Cost	Actual Cost
Land	$ 2,000	
Building	45,000	
Production tools and equipment	873,694	
Other tools and equipment	3,000	
Furniture and fixtures	700	
Truck	4,000	
Total	$ 928,394	

WORKING CAPITAL

Item		Estimated Cost	Actual Cost
Direct materials	- 30 days	$ 25,000	
Direct labor	- 30 days	6,800	
Manufacturing overhead	- 30 days	13,500	
Reserve for sales collections	- 30 days	66,500	
Total		$ 111,800	

CAPITAL REQUIREMENTS

Item	Estimated Cost	Actual Cost
Fixed assets	$ 928,394	
Working capital	111,800	
Total	$ 1,040,194	

SALES REVENUE

The current selling price of 30 pound wrapping paper is $130 per ton. The annual production of this plant is 6,000 tons. On this basis the annual gross sales revenue would amount to $780,000.

RECAPITULATION OF COSTS, SALES AND PROFITS

Item	Estimated Cost		Actual Cost
Direct materials	$ 300,000		_____
Direct labor	81,600		_____
Manufacturing overhead	162,189		_____
Total manufacturing costs		$ 543,789	_____
Interest on loans	$ 30,000		_____
Insurance	1,500		_____
Legal	1,200		_____
Auditing	2,000		_____
Unforeseen expense	20,511		_____
Total administrative costs		55,211	_____
Sales commissions, travel, freight out, bad debts, discounts and allowances		30,000	_____
Profit before taxes		175,000	_____
Annual gross sales		$ 804,000	_____

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	$_____	$ 2,891	$ 34,700	$_____
20	Sales	_____	2,500	30,000	_____
30	Direct Materials	_____	25,000	300,000	_____
40	Supplies	_____	333	4,000	_____
51	Power*	_____	1,250	15,000	_____
52	Water*	_____	250	3,000	_____
53	Fuel	_____	1,000	12,000	_____
60	Unforeseen Expense (Reserve Account)	_____	1,708	20,511	_____
71	Direct Labor*	_____	6,800	81,600	_____
72	Indirect Labor*	_____	3,100	37,200	_____
80	Depreciation (Reserve Account)	_____	7,582	90,989	_____

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

PURCHASE REQUISITION	COMPANY NAME	DATE

- ☐ 10 ADMINISTRATION
- ☐ 20 SALES
- ☐ 30 MATERIALS
- ☐ 40 SUPPLIES
- ☐ 50 UTILITIES
- ☐ 60 UNFORESEEN EXPENSE

INDICATE BELOW THE USE OF MATERIALS

- ☐ DIRECT MATERIALS
- ☐ MAINTENANCE MATERIALS
- ☐ MAINTENANCE SERVICES
- ☐ 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 has 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

Textbook

Pulp and Paper — Miller Freeman Publications, Inc.
Bristol
Connecticut

Periodicals

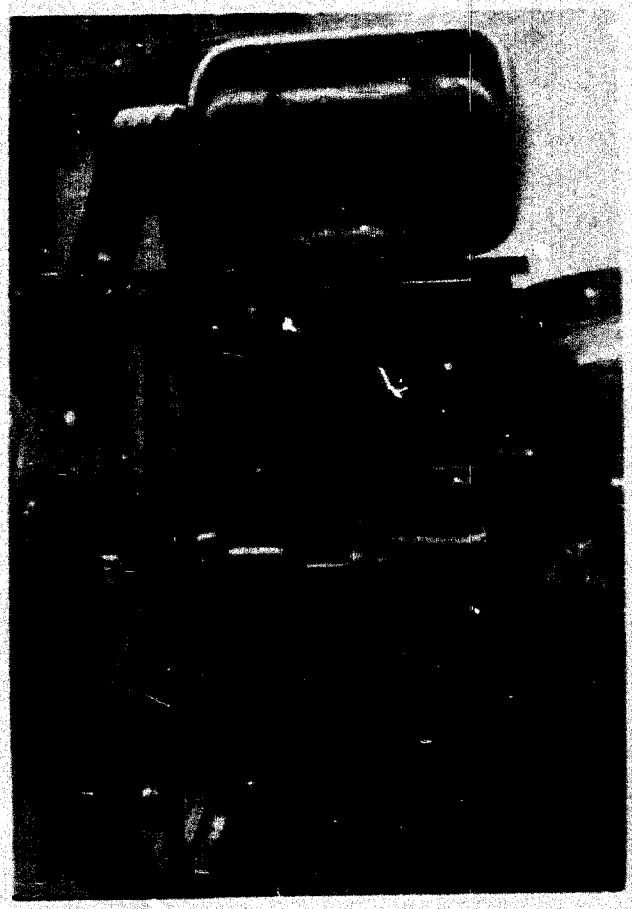
Paper Trade Journal — Lockwood Trade Journal Incorporated
34 North Crystal Street
East Straudsberg, Pennsylvania

Paper Mill News — L. D. Post, Incorporated
3rd Street and Hunting Park Avenue
Philadelphia 40, Pennsylvania

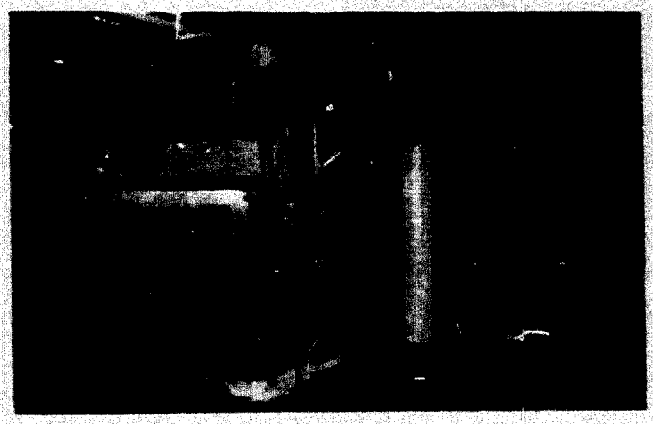
ABBREVIATIONS

'	Foot or feet
"	Inch or inches
No.	Number
hp.	Horsepower
p.s.i.	Pounds per square inch

ELECTRIC STARTING PANEL

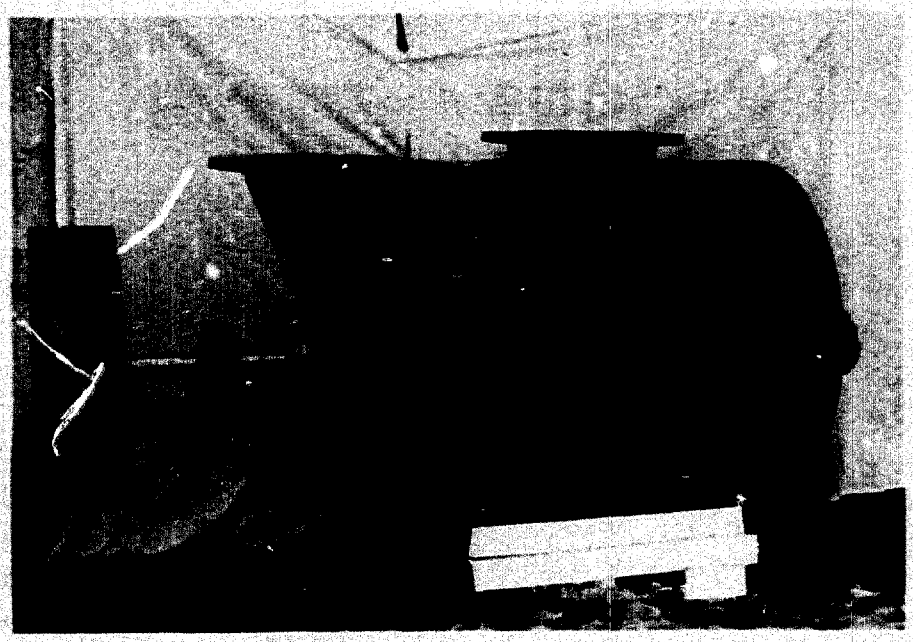


AGITATOR



PULP WASHER AND THICKENER

STOCK PUMP



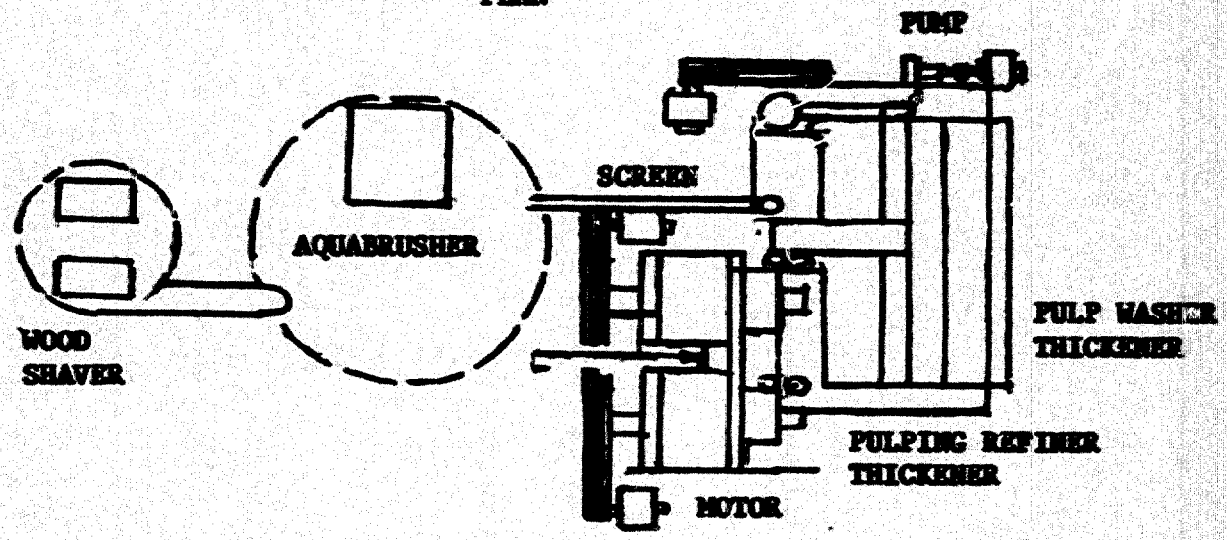
PULP SCREEN

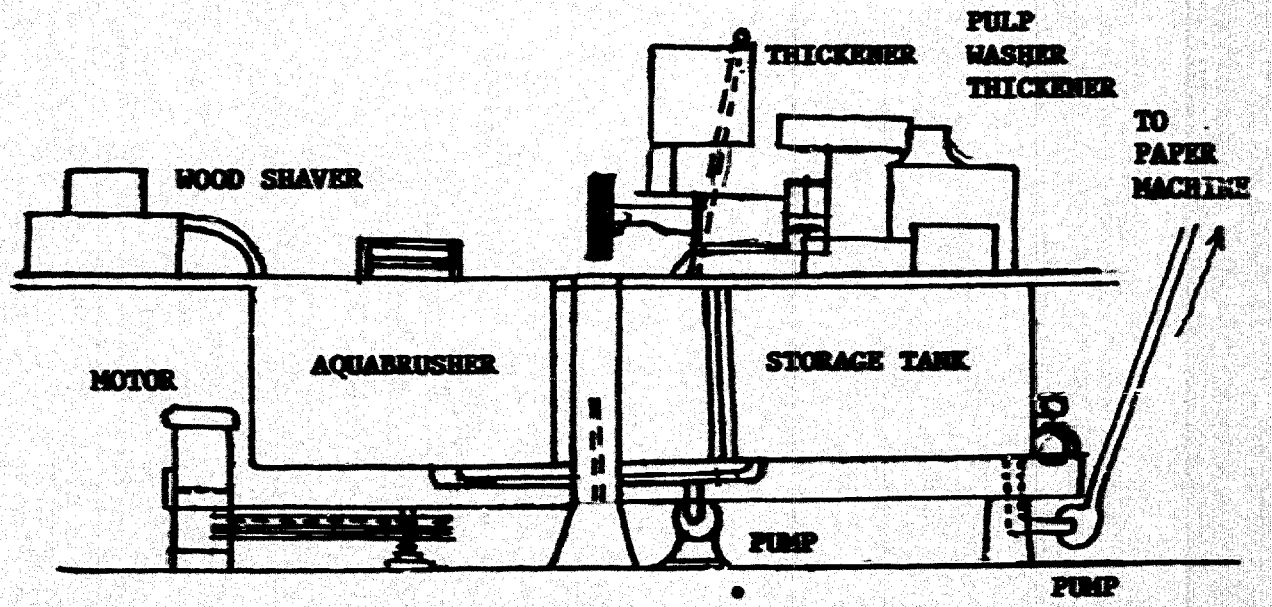
AQUABRUSHER, PULPER AND BEATER

PLANT LAYOUT PULP MILL

(Approximately 30 feet by 60 feet)

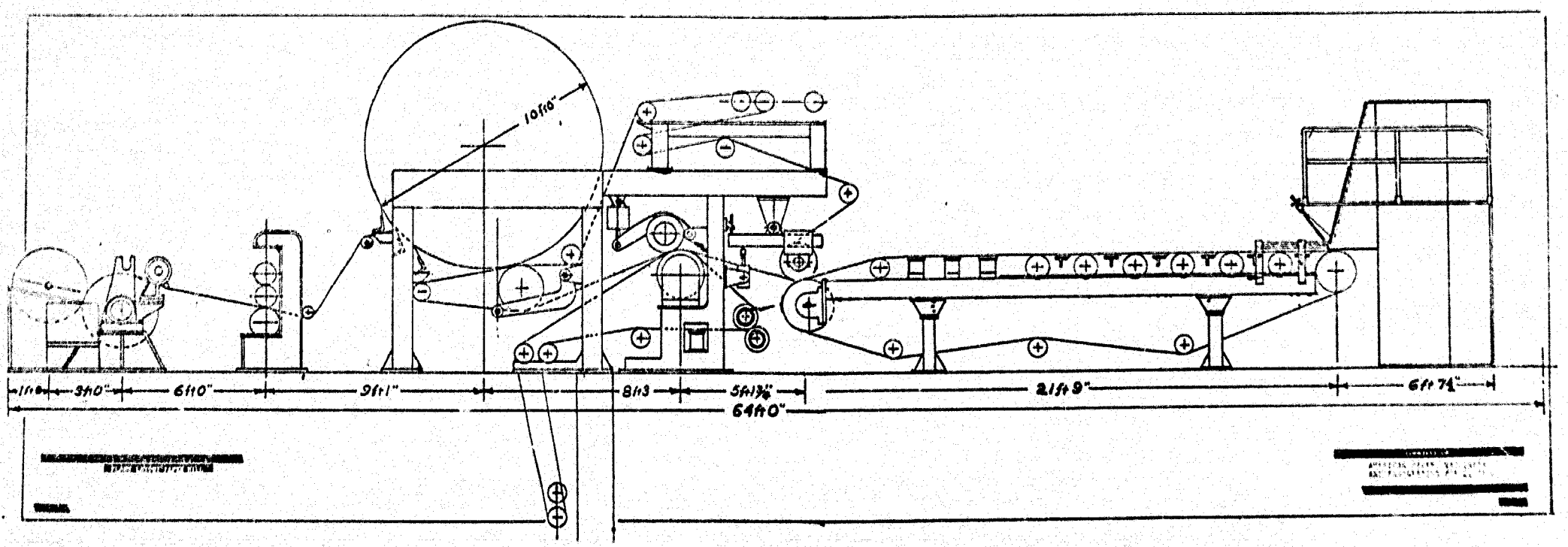
PLAN





ELEVATION

COURTESY OF
AMERICAN PAPER MACHINERY
AND ENGINEERING WORKS, INC.


10ft 0"
1ft 0
3ft 0"
6ft 10"
9ft 1"
8ft 3
5ft 1 3/8"
21ft 9"
6ft 7 1/2"
64ft 0"