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PLANT REQUIREMENTS FOR MANUFACTURE OF SURGICAL INSTRUMENTS

TECHNICAL AIDS BRANCH
INTERNATIONAL COOPERATION ADMINISTRATION
Washington, D. C.

FOREWORD

This brochure is one of a series of reports resulting from overseas technical inquiries on factory or commercial establishments, operation, management, and engineering. The report is designed to provide only a general picture of the factors that must be considered in establishing and operating a factory of this type. In most cases, plans for actual installations will require expert engineering and financial advice in order to meet specific local conditions.

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

The original report was prepared by Barnes Textile Associates, Inc., Boston Massachusetts.

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For further information and assistance, contact should be made with the local Productivity Center, Industrial Institute, Servicio, or United States Operations Mission.

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Surgical Instruments

INQUIRY: Information is requested on the production and plant requirements for the manufacture of surgical instruments including plant lay-out. Assumption of production at a minimum volume level should be made.

INFORMATION SUBMITTED:

In order to select intelligently those few instruments that should be manufactured first, a survey was made of surgical supply procurement as practiced by the various surgical divisions of the U. S. Department of Defense. Selection of the most basic instruments has been thoroughly discussed with them, and the list given below was finally made up with the help of the operating personnel at one of the Department's largest and best known hospitals.

LIST OF INSTRUMENTS

Clamp. Towel, Backhous, 5 1/4"

Forceps, Gall duct, Curved, Lahey, 7 1/4"

Forceps, Hemostatic, Curved, Rochester-Pean, 6 1/4"

Forceps, Hemostatic, Mosquito, Straight

Forceps, Hemostatic, Curved, Rankin, 6 1/4"

Forceps, Hysterectomy, Curved, Pean, 8 1/4"

Forceps, Intestinal, Curved, Boyden, 8 3/4"

Forceps, Intestinal, Straight, Doyen, 9"

Forceps, Intestinal, Straight, Judd-Allis, 7 1/2"

Forceps, Kidney, Pedicle, Curved, Guyon-Pean, 9"

Forceps, Sponge, Straight, Foerster, 9 1/2"

Forceps, Tissue, Tweezer, 5 1/2"

Forceps, Tissue, Straight, Allis, 6"

Holder, Needle, Hegar-Mayo, 7"

LIST OF INSTRUMENTS (Continued)

Handle, Operating, Knife, No. 3

Handle, Operating, Knife, No. 4

Retractor, Abdominal, Deaver, 1 x 12"

Retractor, Abdominal, Double-ended, R-E, Nested

Retractor, General Operating, Nested

Retractor, General Operating, Volkman, 4 sharp prongs

Scissors, Dissecting, Curved, Mayo, 6 3/4"

Scissors, Dissecting, Straight, Mayo, 6 3/4"

Scissors, Operating, Straight, double blunt, 7"

Tube (Suction), Abdominal Pool, 23 Fr

Curette, Mastoid, Oval, Spratt, 3

Elevator, Periosteal, Sharp, 7 3/4"

Forceps, Bone cutting, Curved, Liston-Stille, 10 1/4"

Forceps, Bone-holding, Straight, Lane, 12"

Forceps, Bone, Rongeur, Angular, Stille, 8 3/4"

Forceps, Bone, Rongeur, Curved, Stille, 9"

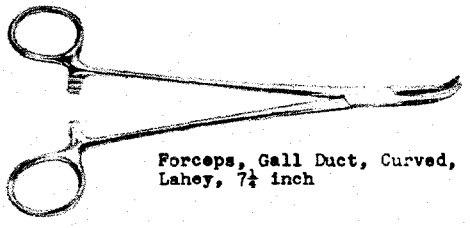
Mallet, Metal, Orthopedic

Osteotome, 6 mm

Osteotome, 12 mm

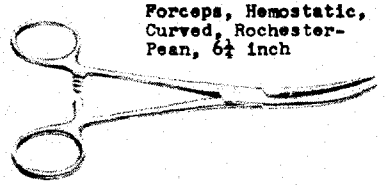
BASIC INSTRUMENTS SELECTED

FOR MANUFACTURE

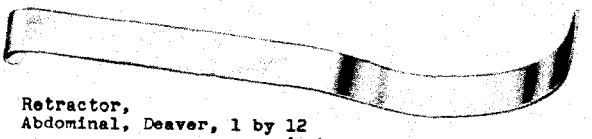


Forceps, Gall Duct, Curved, Lahey, 7½ inch

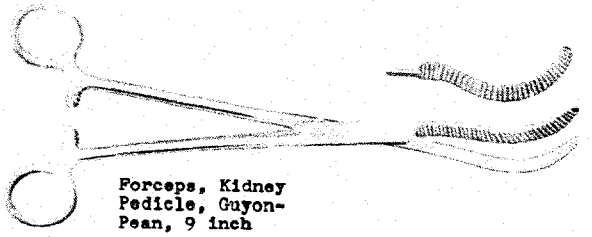
Handle, Surgical Knife, Detachable Blade, No. 3



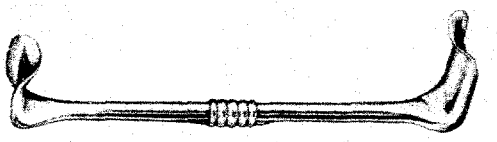
Forceps, Hemostatic, Curved, Rochester-Pean, 6½ inch



Retractor, Abdominal, Deaver, 1 by 12 inches



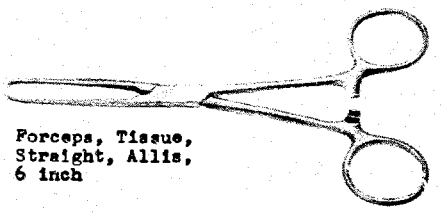
Forceps, Kidney Pedicle, Guyon-Pean, 9 inch



Retractor Set, Abdominal, Double-Ended, Richardson-Eastman

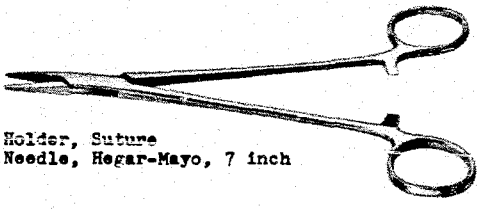
Forceps, Tissue, Tweezers, 5½ inch

Retractor, General Operating, Volkmann, 4 Sharp Prongs

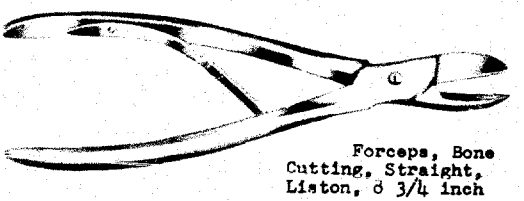


Forceps, Tissue, Straight, Allis, 6 inch

Elevator, Periosteal, Sharp, 7 3/4 inch



Holder, Suture Needle, Hegar-Mayo, 7 inch



Forceps, Bone Cutting, Straight, Liston, 6 3/4 inch

Of the instruments listed on the preceding page those in the above illustration have been chosen for initial manufacture, as being most essential to the immediate needs of small hospitals in rural areas.

There are, of course, great possibilities for expansion even in such a limited plant, since by adding only a few units to the existing equipment, production can be increased and diversified.

CONDITIONS CONTROLLING MANUFACTURE

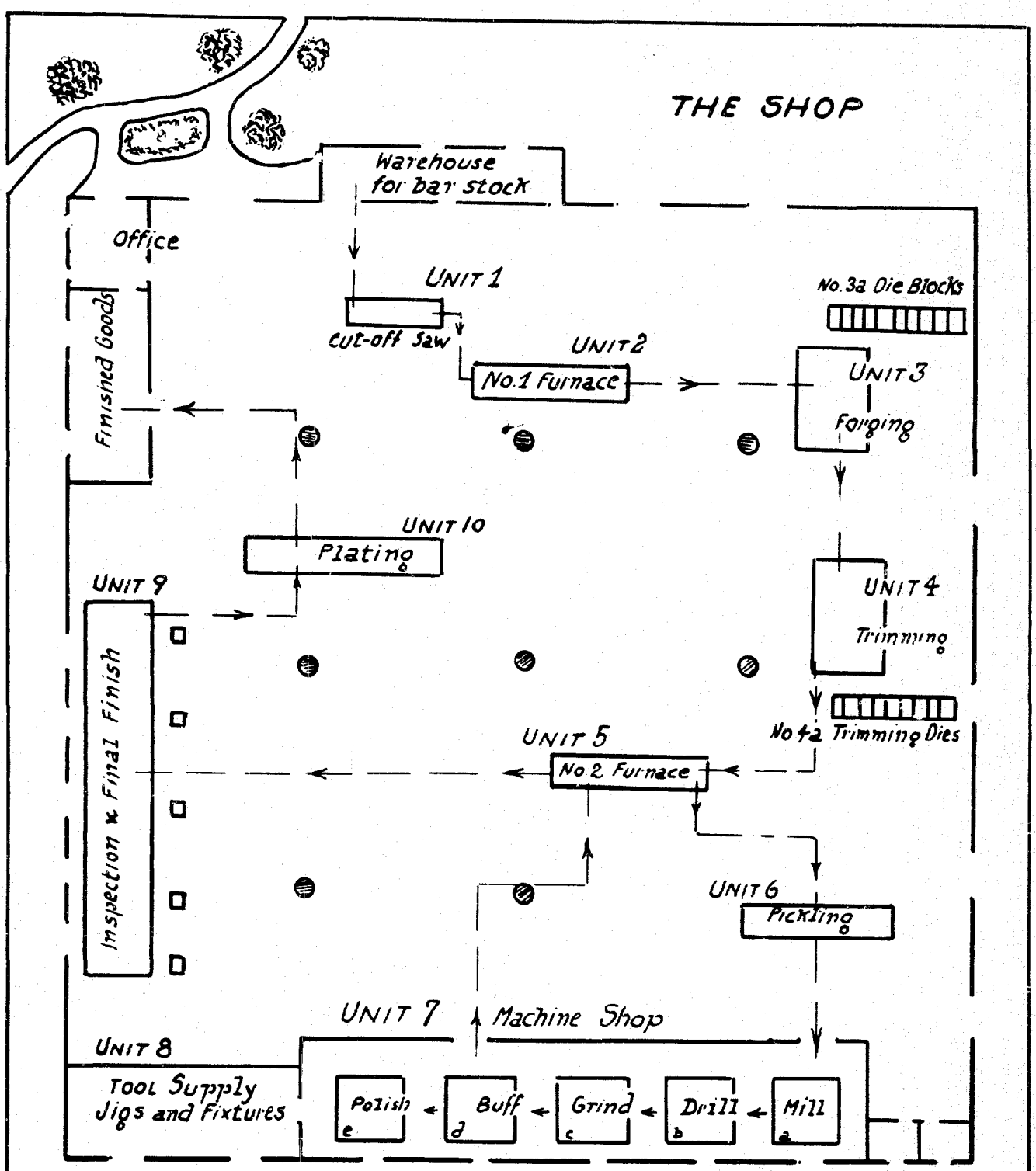
The most important factors controlling the successful manufacture and marketing of the instruments illustrated are as follows:

a) Present Supply and Extent of Demand.- Local production up to now has been on a rather limited scale, but in view of the important role of surgical instruments today in India' national health program, there is an unlimited and continuous demand for increasing and diversifying the manufacture of them.

b) Availability of Material and Labor.- The material needed is readily available, and labor can acquire the needed skill without too much difficulty.

c) Essential Production Tools and Equipment.- The fundamental aim in planning the shop was to keep to the minimum the equipment required to produce only the instruments illustrated on Page 3. The tools and machinery for their manufacture are standard equipment, purchasable anywhere.

d) Available Capital Requirements.- There is a recognized opportunity for industrial expansion in the manufacture of surgical instruments, since most of these are now imported. The industry here suggested would supply only a very small part of the demand for surgical instruments in all urban and rural areas. Such a universally favorable situation should stimulate some enterprising organization to carry out the modest plan formulated in this study.



The above layout provides for the manufacture of the instruments illustrated, and made following highest standards for design, strength, accuracy and finish. (For detailed description, see next page.)

L E G E N D

NUMBER OF UNIT	NAME, SIZE, PURPOSE	PRICE	OPERATORS AND WEEKLY WAGES
1	Small power cut-off saw, to reduce bar stock to short length for heating in Unit 2 . .	$ 400	1 - $60
2	Natural gas or oil furnace to heat end of bars for Unit 3	$1200	
3	Small forging machine to shape bar end to required style shown on Page 3	$2600	1 - $90
3a	Die blocks obtained from die maker. One set of dies for each instrument. Total number of dies - 24	$4000	
4	Small trimming press to trim flash of forged shapes	$2000	
4a	Total number of trimming dies - 24	$3000	
5	Furnace No. 2, to anneal finished forgings after trimming, and to harden them after machine shop operations	$1200	1 - $60
6	Pickling tank to clean surfaces of scales after trimming	$ 400	
7	a) Small milling machine to finish joining surfaces, serretions and teeth	$2000	1 - $90
	b) Small drilling machine to produce holes	$ 200	
	c) Small grinding machine to produce sharp cutting edges . .	$ 350	1 - $60
	d) Small buffing machine to produce smooth surfaces	$ 200	1 - $60

L E G E N D

NUMBER OF UNIT	NAME, SIZE, PURPOSE	PRICE	OPERATORS AND WEEKLY WAGES
8	Stockroom with milling cutters, drills, special jigs and fixtures, extra dies, buffing tools, emery wheels, - total . .	$2000	
9	Bench for visual inspection and final finish by hand, application of protective coating and markings for identification . .	$ 200	2 - $80 ea.
10	Plating for electro-deposited coating of nickel, chromium, or copper nickel chromium . . .	$1000	
ADD	Installation - 10%	$2000	
	Eight Electric Motors	$ 800	
	Various small tools	$ 500	
	*Building, 80'x80', simple design and construction		
	TOTAL	$24,250	

BREAKDOWN OF THE
ABOVE PLAN

Factory Building: The over-all dimensions allow for easy and safe functioning of men and machines. In its erection, climatic and other local conditions can be allowed for. A huge, concrete building is not essential, and a large amount of capital investment in brick and mortar would be pure waste. All available financing should be used to acquire the tools needed to produce the quality and strength required of surgical instruments.

Shop Plan: Necessary space for the operation of each machine, and for the convenient passage of the workpieces from one machine to another have been provided for. Expensive facilities for progressive mechanization or for automatic production have been purposely left out.

While the specified equipment here prepared is to meet only the manufacturing requirements of the instruments illustrated, a greater variety and a larger number of instruments can be readily produced by the installation of a few additional machines.

To keep capital outlay to a minimum, it is further suggested that the procurement of good used machines be seriously considered. All of the machines listed can be obtained second hand from reputable dealers for almost half the price here indicated, and with sufficient guarantees to insure faultless performance.

Shop Plan: (Continued)

Surgery is now recognized as such an essential part of any country's economic, as well as welfare program, that the manufacture of surgical instruments in India should be included in the agenda of the Indo-American Technical Cooperation effort. In order to bring this nearer to fruition, and to further the encouragement of village manufacturing, any possible source of good equipment at a fair price should be considered.

Materials: To meet the varying needs of surgeons and the standards set for surgical instruments, these tools are made today of: a) stainless steel, b) carbon tool steel to be plated, c) high-speed steel able to hold its sharp edges, and d) certain special nickel steels. All these metals are readily obtainable on the home market.

Operators: Handling of the forging machine and dies, and of the heat treating unit requires operators with some machine shop experience; a know-how which can be readily acquired from the instructions furnished, and a little practice. For the operation of the rest of the shop tools, almost any semi-skilled worker will do. The approximate total number of operators required is 6-8.

The cost of the equipment listed on the Legend Sheet is approximate, and is based on Stateside delivery. The building, which contains approximately 6400 square feet of useable floor space, in the United States would cost around $12.00 a square foot, or $76,800. Naturally, there are many types of buildings that could be used in this instance.

The name of any firm, product or process listed herein is not to be construed as a recommendation but merely as a typical reference. Commercial directories will generally supply additional sources of information.

This report was prepared by
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