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CHAPTER - VIITECHNICAL AND THEORETICAL ASPECTS.Technical aspects ^A:

Diesel oil engine is a multipurpose engine used in trucks, bulldozer, and for lifting water. It is made according to these needs. This product is composed of different component parts. Since days of Adam Smith, mechanical and industrial --- progress led to more minute division of labour . Similarly --- " in the manufacturing of a diesel engine for commercial trucks, there are approximately 750 parts ranging from cylinder blocks to fuel injector pins. Each part may requires anywhere from 5 - to 75 separate process steps to produce a finished part." Many plants supply materials, raw castings, forgings to these plants. To produce these parts as many as 300 different materials are - required each with narrow standards on physical and chemical - characteristics and shapes or finishes. Approximately 15,000 -- manufacturing steps are required to convert materials and --- castings into finished parts for a single engine model."⁸³ This

Ref : A: Some of the important processes and working of some firms discussed at the end of this chapter.

83 : " Manufacturing problems in India."
Jack Baranson page 19.

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shows for one single engine 15,000 steps are performed by -- machines and men, because this increases production, involves savings of time and investment. " It is difficult to perform all these steps and manufacture the engines in one single -- integrated plants. Because there are constraints of market, -- whose demand may vary according to needs. Such integrated plants give all types of economies of scale derived from specialization, division of labour, massed reserves, standardisation, but it is only very large firms (like columbus where diesel engines are manufactured in integrated way, that can afford to keep the very expensive machinery of this type running to full capacity. The technical unit is bound to be large here. because the final -- product is highly complicated and it is built up of a great -- number of small plants.

However these advantages can be achieved through -- vertical disintegration of various processes and parts also. In vertical disintegration we find breaking up into many ---- industries which specialize in particular process or products e.g. component parts such as crankshafts, camrods flywheels, forgings in diesel engine. " In motor industry 3/5 of the output

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that goes into the final car comes from these vast plants but 2/5 represents the work embodied in parts bought in from outside firms organized on an average, on a very much Smaller Scale."⁸⁴ When the finishing and assembling requires the technical units on a large scale other processes and products are separated and the small units can obtain all the economies available to the large firm. The remaining process or products can reach their optimum scale with greater division of labour and integration or sub-assemblies. When the total output of various component parts increase, the foundries, the castings section also will obtain the economies.

In diesel engines in Kolhapur also, such vertical disintegration has been achieved, by manufacturing some basic products or processes and purchasing some parts from outside and then assembling it for final product. There are advantages in it. Because it maintains the continuity in large plants which use these components. Otherwise everytime the plant will have to set and reset the machines for various separate and different processes, which it is costlier. In diesel oil engines various

Ref : 84 : " Structure of competitive industry". E.A.G.

Robinson Page 31.

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separate processes are to be performed for manufacturing ----
 separate parts e.g. in Kolhapur various types of oil engines
 are manufactured. They use different model , such as Petter-
 Kirloskar, Slavia, Lister, Ruston and manufacture the engines
 of varying H.P. capacities and the names of the engines differ.
 The components needed in the engines vary according to the H.P.
 In these engines various separate processes are to be performed
 for manufacturing separate parts.

Production Process ⁸⁵

Every part (job) has to undergo the steps viz.

- 1) Pattern making 2) casting 3) Moulding 4) Milling grinding
- machining , honning, drilling, boring hardening, threading
- 5) Sub-assebling, assembling 6) Testing 7) Painting 8)Packing.

These processes require various types of -----
 machineries for which huge sums have to be spent. Hence part
 production by specialist firms is justified. The continuity in
 the work at foundry, forging, casting etc. will depend on the
 demand coming from component part manufacturers, who depend on

 Ref : 85 : Detailed discussion follows at the end of this
 chapter.

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assemblers and manufacturers and in turn the final product depends on the market. If demand increases, all these ----- manufacturers at all the steps enjoy economies of scale. There is interdependence, this interdependence plays important role in this industrial structure.

The modern industry has a logic of its own, a logic of scale economies and of intra and interfirm ----- specialization and division of labour."⁸⁶ Achievements of -- economies of scale is the essence of all industrial units, -- whatever may be the scale of production. Economies of scale - imply reductions in average unit costs which are associated - with higher levels of productive capacity. Hence," efficient modern industrial production is achieved through a net work of supply relationship in which firms depend on large number of other firms for steady supplies of components made to strict and reliable specifications. The final product can only be -- produced efficiently if all the inputs are produced efficiently.

Ref : 86 : " Harry G. Johnson- in introduction to manufacturing problems in India."

Jack Baranson Page 8-9

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If the sub-structure of efficient supplying firms is lacking, and the enterprise is instead obliged to go into the business of producing parts itself or depend on unreliable and inefficient local part producers, the cost of production can rise to ---- incredible heights."⁸⁷

The principle behind this is that the product must possess quality and its price must be cheaper. its costs of production must be low. This ancillary assembling relation is founded on the laws of comparative cost advantage accruing from cost differentials in manufacturing the parts or purchases from outside. Economies of scale thus favour the small ----- manufacturer. A large firm may not effectively utilize a ---- particular tool or component which enters into its product. -- Other large firms may need similar tools or components. A -- relatively small outside firm which specializes in some of these ' ancillary ' items and sells them to several large firms who require them may thus be able to benefit more from economies of scale in its narrow specialized field than can one of the large firms which undertakes to make the items for itself in an ---

Ref : 37 : " Harry G. Johnson- in introduction to
manufacturing problems in India."

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independent way.⁸⁸ Thus whatever may be the economies of scale a firm cannot exceed its permissible size determined by its - production functions. Diminishing return will set in. So ---- certain components will have to be secured from outside ---- sources. They may be purchased from other countries but when govts put import restrictions with a view to develop import substitutes then small manufacturers or ancillaries get --- encouragement and scope.

Definitions of ancillary units :

The structure of modern large-scale industrial units is such that they require a wide range of components, parts and sub-assemblies in huge quantities, which they need not necessarily manufacture in their own works. In Kolhapur Diesel oil engine industry also the industrial structure is composed of manufacturer, assemblers, ancillaries. These -- ancillaries are dependent on large units, manufacturing and assembling end products.

Ref : 88: " Problems and possibilities of ancillary industries in a developing economy ".

Page 8 S.K.Basu, Alak Ghosh .

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The concept of ancillary relationship between large and small industries has been given the name of sub - contracting. " An ancillary unit can be defined as a " Unit manufacturing parts and components for supply against known or anticipated demand of one or more large units manufacturing assembling complete products and which is not a subsidiary or controlled by any large unit in regard to the negotiations of contracts for supply of its goods to any large unit.⁸⁹

2) " A unit which produces parts and components and which supplies these products to the assembling units or to replacement markets. "⁹⁰

3) An expert committee appointed recently by the - Ministry of Industrial Development Suggested a definition of ancillary unit. " A small ancillary unit shall mean a unit," in which the total capital investment of machinery and --- equipment does not exceed Rs. 10 lakhs. 2) Which produces ---

Ref : 89: Problems and possibilities of ancillary industries
in a developing economy Alak Ghosh and other .
Page . 2

90: Problems and possibilities of ancillary industries
in a developing economy Alak Ghosh and others .
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parts, components, sub-assemblies and toolings, intermediates or inputs for supply against known or anticipated demand of one or more units manufacturing/ assembling complete products, 3) which supplies or proposes to supply directly at least -- (a) 10% of its production to one or more large-scale industrial units and iv) which holds a certificate from the State ----- Directorate of Industries that it is an ancillary unit.⁹¹

The revised definition of ancillary is an -----
 " undertaking having an investment in fixed assets in plant and machinery not exceeding rs. 15 lakhs and engaged in ---
 a) the manufacture of parts, components subassemblies, tooling or intermediaries b) rendering of services and supplying or proposing to supply or render 50% of this production or the total services to other units for production of their article.⁹²

The scope and definitions of ancillary units have been gradually extended in view of the specialized type of -

Ref : 91: Industrial Development of India-Policy and

Problems- edited by C.N.Vakil: Page 76-77

92: 4th plan quoted in, " Industrial India "

volume XXVI No. 2 Feb. 1975.

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machinert and equipments needed to adhere to the quality - specifications laid down by the parent unit.

There ancillary industries have been realized - by govts and various industrial policies of 1956 and 1977. The ancillaries have a place in building up a viable - - - industrial sector by correcting regional imablances and -- accelerate the process of industrial diffusion and dispersal, and they are justified as we have seen on techno-economis - - considerations.

Classification of ancillary industries:

Ancillary industries may be broadly classified into two categories (i) ancillaries which manufacture standard components and parts for many large industries (2) Ancillaries which supply components and parts to specific large scale - industries such as automobiles, machine tools where they are used as original parts and have to conform to strict - - - standards of quality and specifications prescribed by the - - parent unit." The production programme of this type of - - - ancillary units is devetailed with that of the large parent units."⁹³

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2) Another classification is based on the extent of purchases of components from ancillaries. Accordingly there are 1) manufacturers 2) Assemblers 3) component - - - - - manufacturers 4) others such as foundries, fabricating -- units steel metal works, packing and painting units. The - - Manufacturers purchase less than 70% of the parts, the --- assemblers purchase more than 70% of the parts. According to one survey, there were 20 manufacturers, 45 assemblers and 400 ancillaries and 80 others.⁹⁴

3) This classification is made on the basis of the method of selling. 1) Units entirely depending on the demand of some specific patent establishments. It is called as - - "Wholly ancillary units" A special sub-group under this -- category are those units, though very few in number, who -- operate as sub-contractors to other units. This sub-group may be called as " Sub-Contracting type " of ancillaries.

2) There are ancillary units supplying their -- entire output to the replacement market. These may be -- called " Open-market Sellers".

Ref : 94 : "Recession in Engineering industry" of Kolhapur
SIET publication. Hyderabad.

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3) There are some-having a share of both open -
-market and sub-contracting. They are called as "mixed type"
of ancillaries.⁹⁵

Scope for ancillaries :

In almost all the countries of the world we find
ancillarisation or sub-contracting developing. In Japan - -
components for sewing machine, bicycle, automobiles are - -
subcontracted from 40% to 54% of the production. In west - -
Germany, U.S.A. the dependence on ancillaries vary from 40%
to 50% respectively. The tractor units such as Escorts, -
Fordson, Eicher or the U.S. Steel Corporation, Automobile - -
industry purchase components from outside. The developed - -
countries depend on component manufacture, show the importance
of inter-relation and interdependence in industrial structure.

Besides its place in industrial structure, - - -
ancillaries play a role of connecting ladder in linking - -
agriculture and industry.⁹⁶

Ref : 95 : Problems and possibilities of ancillary industries
in a developing economy". S.K.Basu, Alak Ghosh,
page 139.

: 96 : "Strategy for agricultural development" S.R.Sen
Page 4, Asia Publishing house.

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Significance in Kolhapur :

In the first chapter we have noted that the - - agricultural needs of the farmers viz. water supply inspired the earlier ' Karkhandars ' to undertake the production of oil engines. The spread and use of oil engines has come to a - - saturation point and new substitutes are being used by the farmers. Industry has assisted the majority of the farmers in transforming traditional farm techniques. The need of the farmers have led the manufacturers to transform the - - - traditional techniques of manufacturing practices, and Green Revolution and industrial revolution have been integrated for the benefit of both the sector in Kolhapur. Mr. S. R. Sen (India) and Mr. T. W. Schultz (America) have emphasized the need to break the equilibrium or quasi-equilibrium in agriculture by adopting new techniques.

Kolhapur has developed an industrial ladder which has brought step by step the engines, agricultural implements produced in the area to the farmers and induced them and - enabled them to modernize the farming techniques. The - -

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industrial development has not remained an island as found elsewhere,⁹⁷ but has been intergrated as part of area development with the agricultural sector. In Gujarat we find healthy farming community exploiting the opportunity created by dairy industry, use of diesel pumps and ancillary industry. Similarly in Kolhapur Co-Operative movement and oil engines have helped the farmers to introduce modernization in agriculture. Manufacturers of oil engines should start production of agricultural - - - machineries such as hand tractors, improved types of plough. hoe, harrow, weeder, sprayer, duster etc. The farmers are -- accustomed to use machines. But manufacturers of agricultural implements should open and employ large staff of salesmen and extension workers. They should popularize these implements. In china " 85% to 90%. Of recent increase in production is due to technical services and supplies."⁹⁸ This fact emphasizes the need to develop " Marketing methods."

" It is only the development of such industries as have a link with agriculture can help agricultural development."

" We should also arrange to set up subsidiary industries which

 Ref: 97 : "Strategy of agricultural development"
 S.R.Sen. Page 15.

: 98 : "Strategy of agricultural development."
 S.R.Sen. Page 15.

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will produce agricultural implements and machinery and use all the techniques of salesmanship not only to make these implements available to the agriculturist but also to make him interested in using them." " The introduction of power-electrical and -- diesel is a link between industry and agriculture. They help - agriculture by operating irrigation pump and enabled a number of small industrial units. These pumps and the industries have made the local farmers more technical minded and progressive."⁹⁹

Important production processes.

Though not in detail yet some general and main - processes will be explained with a view to know the complexities in production, need of raw material, machine and the dependence of artisans on these processes and manufacture of components.

I) Pattern making :- The pattern makers are highly skilled craftsmen. They are experienced in handling the tools and reading the drawings and preparing a pattern or core box. He must know the processes involved in the foundry in the ----

Ref : 99 : Strategy of agricultural development S.R.Sen

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manufacturing of castings.

i) The first step in making a casting is to prepare a model of the article required. i.e. a pattern.

ii) The pattern material should be made of such --- materials which should be strong to with stand ramming, rapping and abrasive action of sand, should have well finish to give -- clear castings.

The raw material used for pattern making may be wood, metal, plaster of paris, plastic, wax or aluminium. Pattern --- making tools 1) Marking and measuring tool 2) cutting tools - 3) Planing tools 4) Striking tools 5) Boring tools. 6) Holding tools 7) Wood turning lathe 8) Circular saw 9) Band saw ---- 10) Scroll or jig saw etc.

Types of pattern -

Patterns are made in various forms to suit the type of moulding to be carried out. The first requirement is easy -- withdrawal from the sand without tearing the mould. For this - there are 12 types of patterns, some of them are solid or single piece pattern 2) Split pattern or two pieces pattern 3) Loose

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piece pattern 4) Pattern with follow board. 5) Match plate pattern etc.

Some allowances such as Shrinkage, draft, --- finish, distortion, shake allowances have to be made. The cores may be verticle, balanced and hanging core.

Moulding :

The mould into which metal is poured is made up of some heat resisting material as well as climatic change. Sand is the most often used (in Kolhapur also) as it is easily packed to shape in some-what porous and resist high temperature. There are eleven different types of moulding sand 1) Green --- 2) dry 3) facing 4) parting 5) Backing 6) floor 7) black 8) core 9) system 10) oil sand etc.

Type of moulding tool :

1) Shovel 2) Riddle 3) Rammer 4) Bellow -----
5) Trowels 6) Slick 7) Cleaner 8) Lifter 9) Swab 10) Draw spike
11) Spruce pine, mallet, moulding machines and boxes.

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When big mouldings are to be done, the foundry in which big castings are to be done quickly and with small number of workers, modern sophisticated moulding machines have to be used. They are squeezer machines 2) Sand slinger 3) Jolt machines 4) Stripping plate moulding machine 5) Turnover machine etc. These are costlier and small units cant have them. Some units surveyed expressed the difficulty in getting new machines.

Foundry - (Castings)

In a steel foundry, steel scrap is melted in a furnace and after it has been purified and the required composition has been achieved, the molten metal is poured into ingot moulds to get ingots or into casting moulds to get castings desired and allowing it to solidify.

Casting processes -

a) Conventional sand casting, b) metallic mould casting i) permanent mould casting or gravity die casting ii) slash casting iii) die casting. c) Non-metallic mould

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casting- 1) plaster mould 2) shell mould 3) lost way precision 4) centrifugal casting. Continuous casting, carbondioxide mould process.

While casting the metal should be in molten stage. For melting the metal there are different types of --- furnaces.

- a) Crucible furnace.
- b) Electric furnace.
- c) Open hearth furnace.
- d) Air furnace.
- e) Cupola furnace.

In Kolhapur ' Electric furnace' and ' Cupola furnace' are used.

This description of various processes involved in manufacturing a job will give us the idea of a need to --- maintain continuity in the process, if costs are to be ---- reduced. If demand for such processes is limited or quality is not upto the standard the castings are purchased from ---- other places.

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Production in Kolhapur :

Main production in the units surveyed is

i) manufacture of oil engines and components needed for it
and ii) components for other products such as automobiles, --
sugar textile machinery etc.

ii) Nearly 50% of the manufacturers started
' multi-product ' production.

iii) The units work as ancillaries to some
parent units and purchase some parts from other units which -
specialize in some parts. There is a sort of bilateral exchange
or auxiliary and ancillary relations, interdependence and ----
interrelations.

3) i) There is intra-firm exchange among the
manufacturers ii) Interfirm exchange between manufacturers and
assemblers iii) Sell to outsiders. These relations are -----
reflected in cost price differences, and accordingly the price
of end-product namely the ' engine ' differs at i) manufacturers
level 2) Cost of production 3) price at which it is sold to the

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market iv) and price at assemblers level.

The units in Kolhapur manufacture and assemble the oil engines and manufacture spare, component parts of oil engine and other products as well e.g.

The Maharashtra co-operative engineering society Ltd.

Main Products - 5 H.P., 6 H.P. Oil engine ' Mayur '.

Subsidiary products- Power tillers, Iron wheels, Fork rotary tines, water field riding apparatus, Riding sadal, leveller, two wheeled trailers. The company is thinking of introducing new -- products viz. 1) Air cooled engine 2) Four wheeled trolley.

2) Menon Piston - Manufactures pistons mainly for oil engines and automobiles. They supply pistons to Kirloskar- cummins Ltd. Kirloskar Oil engines Ltd., H.M.T. Ltd, Cooper engineering works Ltd. They plan to expand production by 20%. Menon Pistons located in MIDC area Shirolli manufacture Pistons, which are quality -- product judged from international standards. Menon group well illustrated the example of multi-plant firm. e.g. Menon and Menon, Menon Automobiles, Menon diesels, Perfect pins etc. Menon and --

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Menons, manufacture Oil engines. They are multi-product plants also, as they manufacture components of Tractors for - - - - Hindustan, Escorts, Mahindra and Mahindra, H.M.T. Menon - - diesels manufacture Cylinders and liners, Perfect pins' -- manufacture - Gudgeon Pins; Besides these Menon Pistons supply Alphin pistons to Kirloskar - Cummins. Ruston and Hornsby, Kirloskar Oil engines, Kirloskar pneumatics, Hindustan - - Tractors, Cooper engineering. This group possesses technical perfection, Skill due to constant attention to quality. The Menon group manufacture Crank Shafts Connecting rods, Cylinder liners, Cast iron pistons, which are the spare parts needed in diesel oil engines.

In due course of time this group proposes to -- manufacture and develop Piston ring unit in collaboration -- with "Nipon Piston rings". Thus Menons are manufacturers, --- assemblers and ancillaries also.

3) Kolhapur Auto Works :

Manufacture parts of oil engines and bearings - - needed for Machines in Sugar industry.

4) Eloquent engineering and E.D. Steels Private Ltd.:

Manufacture crankshaft, cam Shafts, Cam rods for

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diesel engine, cam gear, cam shaft gear, cylinder head, - -
connecting rod. 5) Rocket engineering corporation manufacture
spare parts and oil engines.

6) Roopa engineering Works:-

Centrifugal pumps.

7) Shri Datta Engineering corporation Kolhapur:-

Manufacture liner piston for oil engines, piston,
flywheel.

8) Hudli and sons :- Spare parts, piston, flywheel and oil
engines.

9) Pakco - Manufacture grinding mills, rice hullers, slow
speed horizontal oil engines.

Besides manufacturing and supplying the respective
parts, the manufacturers purchase the parts and processes not
manufactured by them from other units e.g. Crank case, Head,
Cylinder, Nozel, liner piston, fuel tanks, Bosch pumps castings
and forgings manufactured by other units.

Main assemblies and component parts used in --
them. The names of important manufacturers of these spare and
component parts.

There are seven main assemblies, and component
parts used in them differ in number according to the type of

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engine manufactured e.g. in 6 H.P. Lister type ' Menon 'engine manufactured, the seven assemblies consist of nearly 169 parts and 22 spare parts. Spare parts for Menon 5 H.P. Diesel Oil engine is 59.¹⁰⁰

Main assembly lines*

- 1) Camshaft idler gear assembly.
- 2) Fuel Bracket assembly.
- 3) Crankcase Assembly.
- 4) Crankshaft connecting rod & Piston assembly.
- 5) ~~Cylinder~~ head assembly.
- 6) Fuel Oil system.
- 7) Lubricating oil System.

Names of the parts :

Names of units manufacturing
component parts.

1

2

1) Crank Shafts.

1) Eloquent engineering.

2) Momin and Momin.

3) Development engineering.

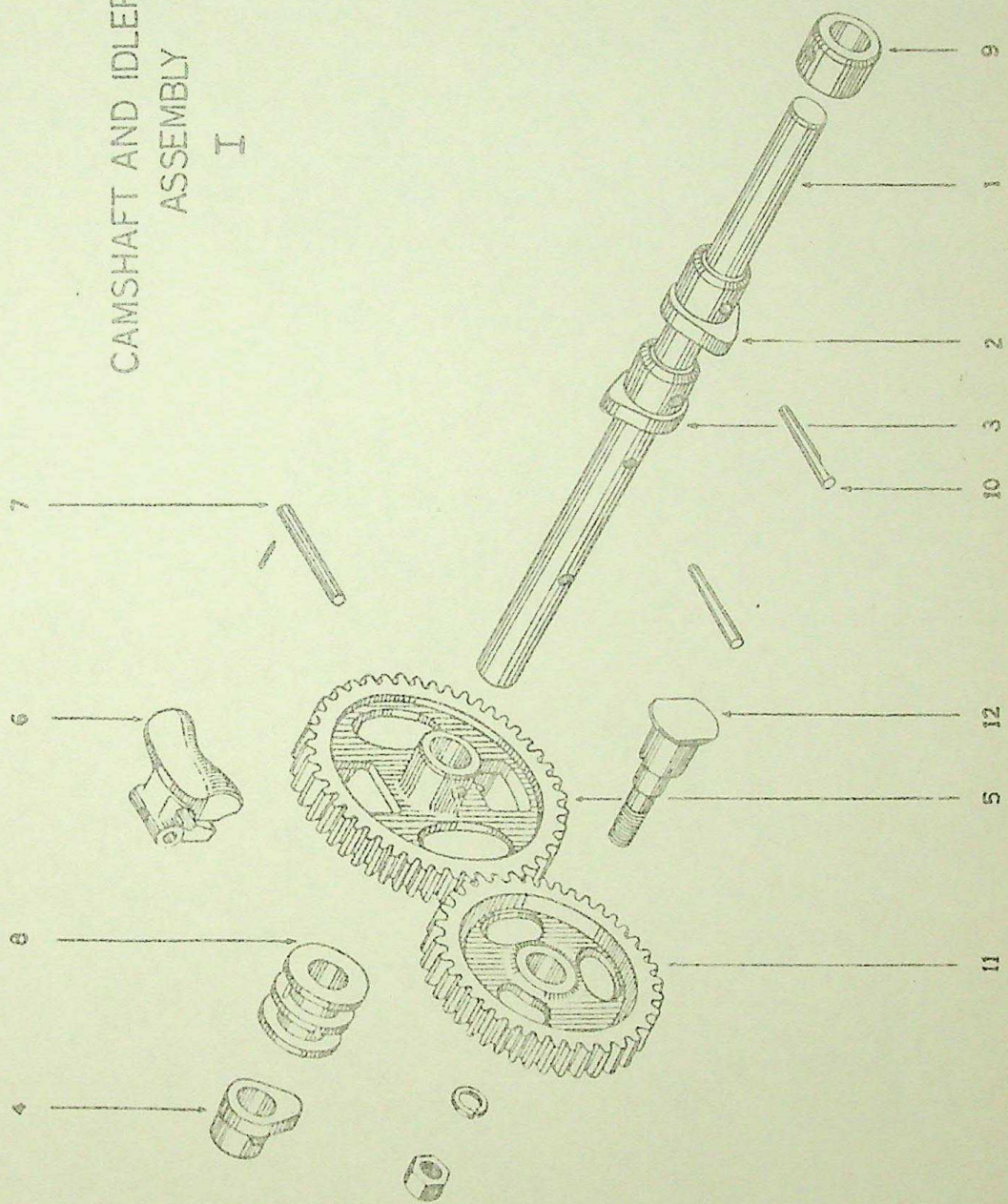
Ref: 100: Menon diesel engine Maintenance Manual
" and price list" 6 H.P. 650 R.P.M. spare
parts 1969-1975-

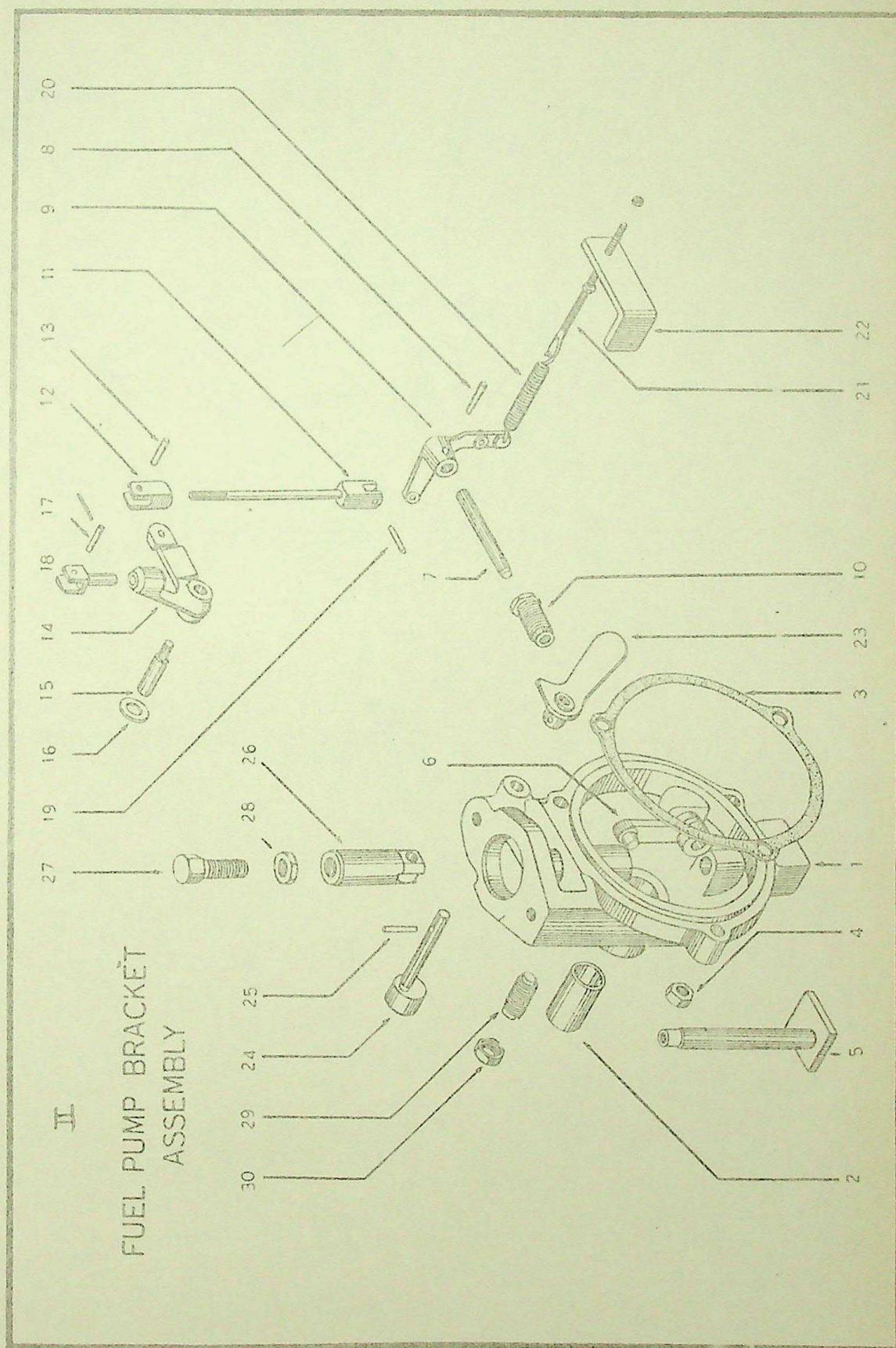
* See the assembly line plates.

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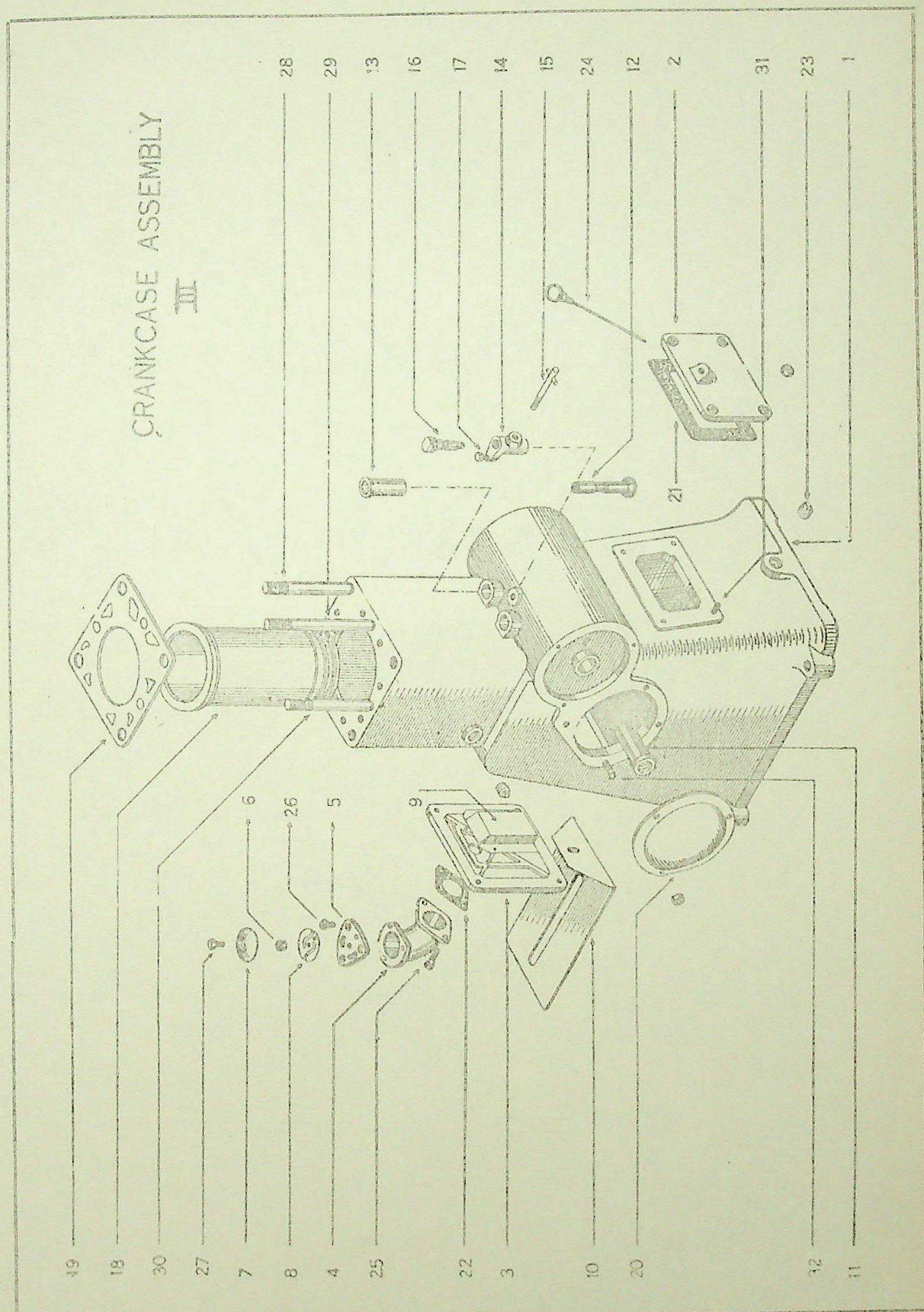
CAMSHAFT AND IDLER GEAR ASSEMBLY

I



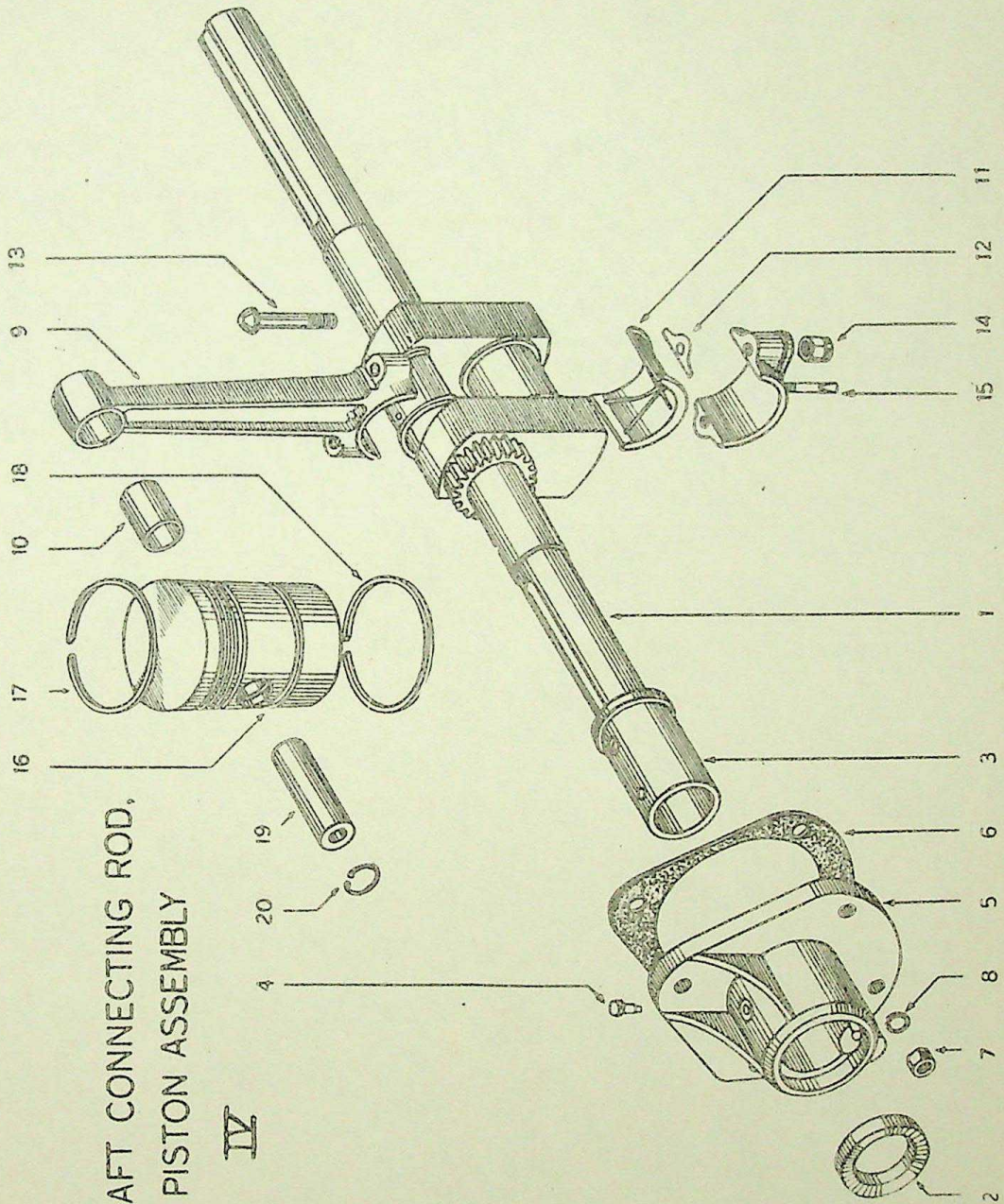


CRANKCASE ASSEMBLY III



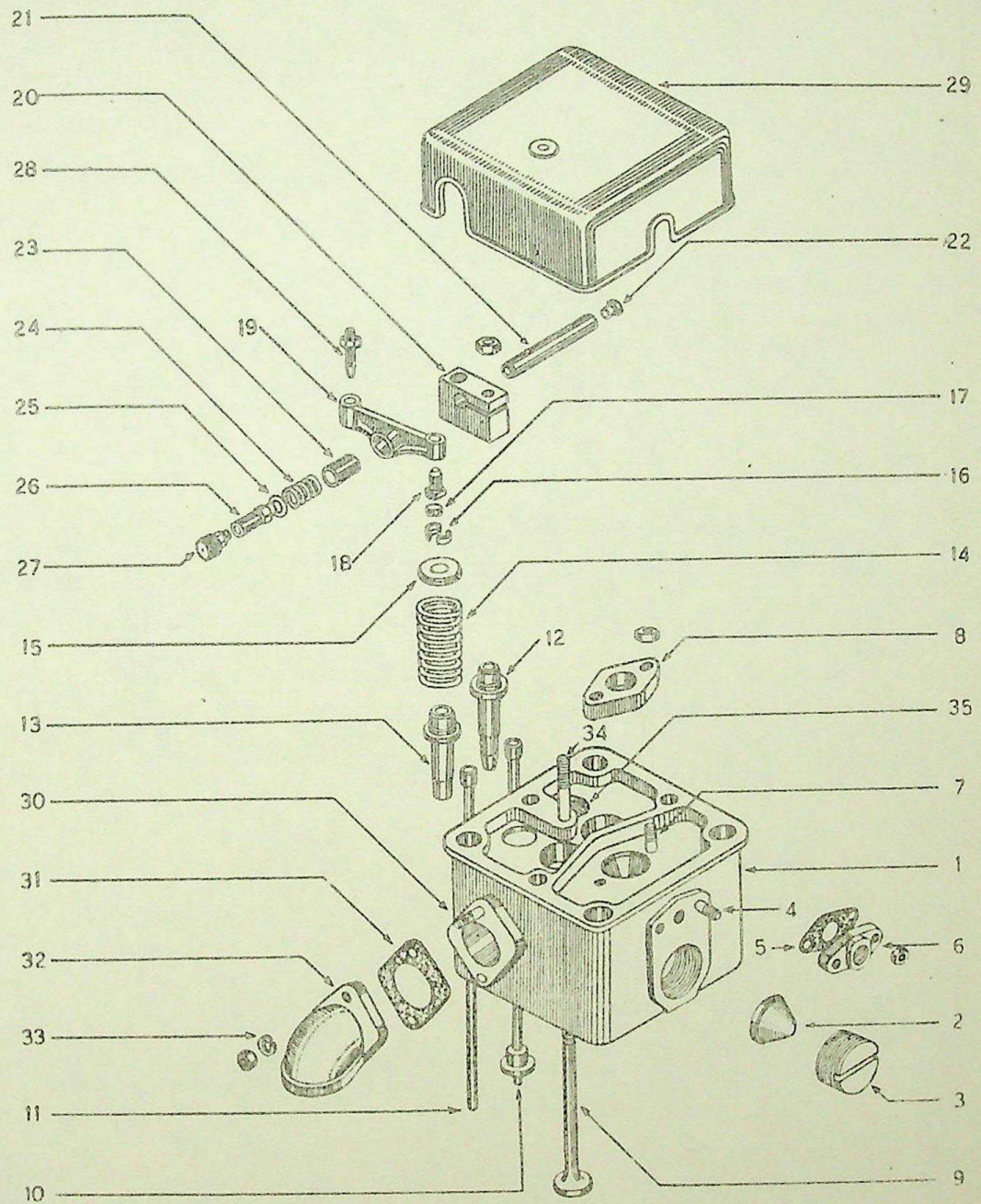
CRANKSHAFT CONNECTING ROD,
AND PISTON ASSEMBLY

IV



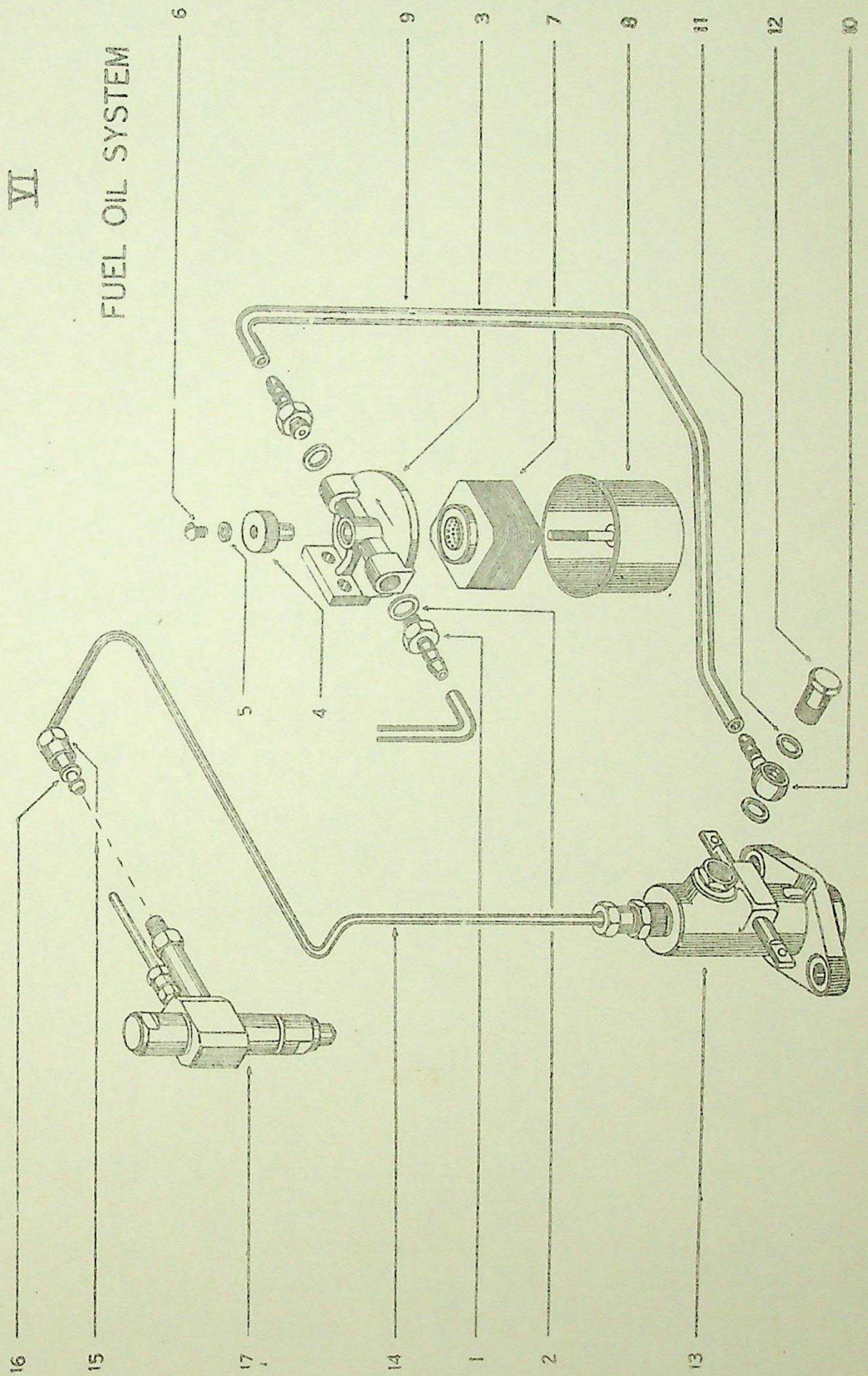
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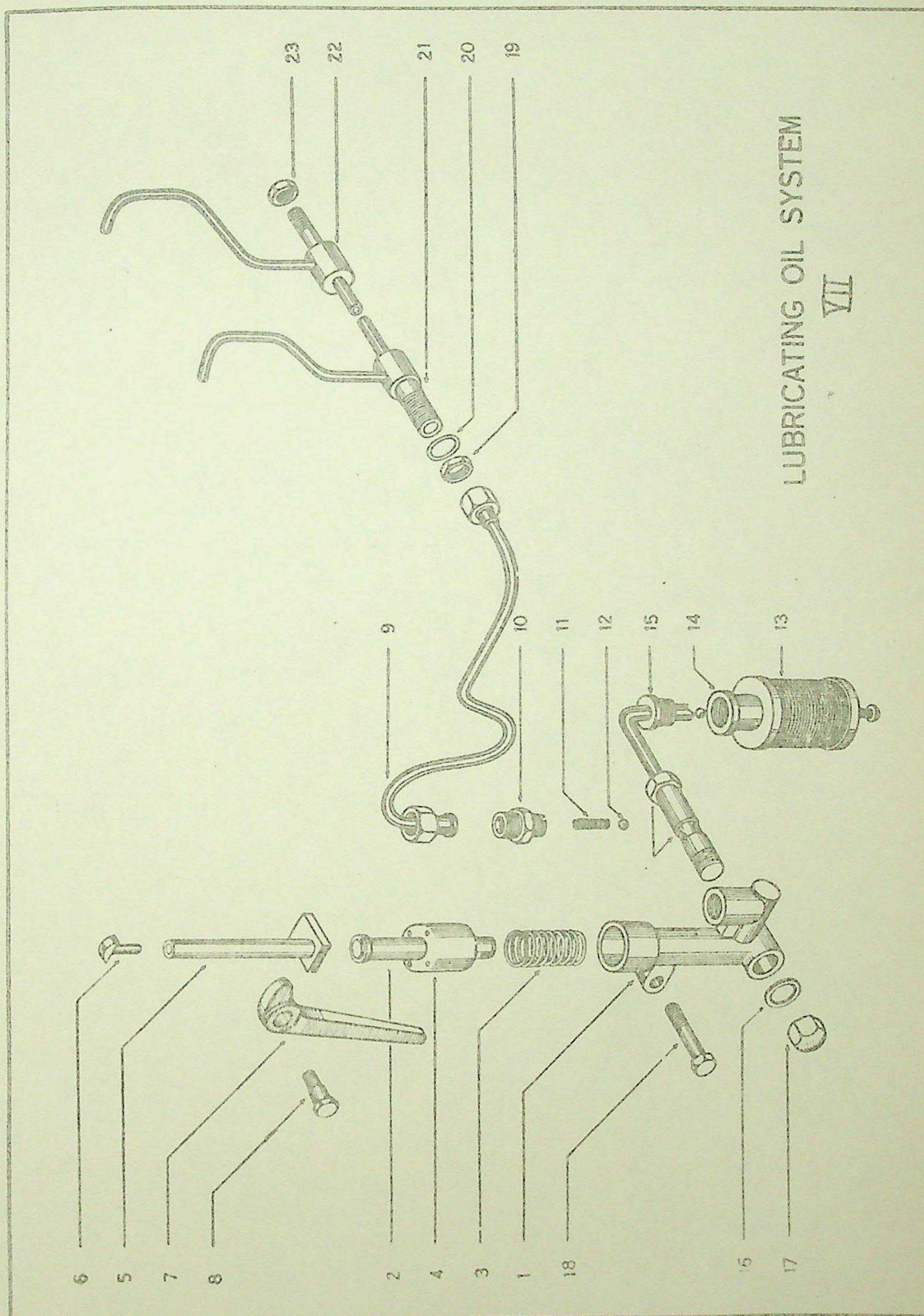
CYLINDER HEAD ASSEMBLY



VI

FUEL OIL SYSTEM





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2) Piston rings.

1) Menon Piston.

2) Khadke Works.

3) K.S.Patil

3) Fly Wheel.

1) Hudli and Sons.

2) Maratha engg.works

4) Bosch Pump

1) Mico Co-Madras.

and

2) Fuel Co-Bombay.

5) Nozel.

6) Cylinder block.

1) Hudli and sons.

2) Mane and Mane.

3) Laxmi engg. works.

4) J.K. engg. works.

7) Centrifugal Pump.

Roopa, Laxmi.

8) Crank Case.

1) Arwade 2) Shahu 3) Hudli.

4) August 5) Sky 6) Rocket

7) Roopa 8)Virging 9) Yeshawant
works.

Besides these main items other parts such as cam
Shaft, balance weight, Flywheel pin filter fuel, gasket, -
speedle Spring.Oil seal Valve and spring, Fulcrum pin, - -
bearings etc. are manufactured in some units in Kolhapur, -
Karad, Ichalkaranji, Bombay also.

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The list of the components part gives us the idea of component manufacturers manufacturing these parts. One part is manufactured by many units. In the market for ~~various~~ parts (i.e. buyers and sellers of parts) some units dominate this market by the virtue of the quality, cheap price, prompt delivery of the goods. The dominating unit is generally capturing the market e.g. in the manufacturing of "Crank Case" Shahu engineering works, in " Piston " and 'Piston rings' Menon Piston and menon ancillaries dominate. Other units manufacturing the same products will have to consider the factors behind such domination.

The manufacturer or the assembler has to choose the required part from among the many markets manufacturing the various parts. By market we mean the buyers and sellers for products. The products may be the end products of the plants producing them. 2) They may be the raw material for the users, using them in assembling. Spare parts are the end-products of units manufacturing them, and they are the raw materials for manufacturers / assemblers who are manufacturing the end-product for sending it to the ultimate consumer market. Thus there is i) Spare/component parts manufacturers market.

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2) End products market- In each of the markets - - there are sellers (manufacturers) and buyers(consumers) from Kolhapur, Karad, Ichalkaranji, Bombay, Madras etc. The prices in all these are dictated by the efficient firms. - Generally the firms compare the prices with others and cheap price is demanded. The cheap price implies cheap costs of - production, which is available only when the expenses incurred on the manufacture of spare parts/components or manufacture of final products are low. Expenses have to be incurred on production, capital, marketing etc. comparative advantage of any of these items will give an additional advantage to the production unit.

From the information collected in respect of units surveyed it was found that major cost items were raw - - - material and fuel and power. Labour charges forming small - percentage. This is experienced by small units as well as - large units in connection of their respective production - - component and endproducts as well e.g. percentage of costs incurred on labour was 16.81%, raw material 81.76% and fuel 1.41%*

Ref.* Concerned Table No.17 in Part II.

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When we come to fixation of prices of these parts or products the question is which method is followed? The problem of -- fixation of prices of spare parts is different from the prices of end products. A firm if it is a multi-product plant or - multi-plant firm, it is sure to enjoy the benefit, out of cost difference. It will compare the cost of its items with those of others. If the bargain is between a multi-product and multi-plant firm owned by the same company on one hand and the manufactures of parts, producing single product and not --- supported by other firm, will have to submit to the dominating firm or the large firm.

In Kolhapur, we find a number of multi-product plants and multi-plant firms. They enjoy technical economies arising out of larger capacity equipment use of specialized equipment and specialized personnel. The names of multi-product plants is given above. The "eloquent engineering corporation." "Development engineers Ltd." and "Ganesh foundries" or -- - "Ghatage-Patil" " Kirloskar-Ghatage-Patil" or " Menon and - Menon" and Menon ancillaries" can be mentioned as the examples of multi-plant firms. These firms enjoy the economies of scale out of specialist services, saving in selling and transport costs, research. 2) Specialization at each plants. Production

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is divided in series of plants, each specializing in a - - limited range of production. Thus the cost-saving benefits are enjoyed by the firm.e.g.Eloquent engineering at Udyamnagar manufacture ' Crankshafts, Cam Shafts for diesel engines at their M I D C plant Viz.E.D.Steels private Ltd.They manufacture cam gear, cylinder head,connecting rod, 3) At Ganesh foundry, Ichalkaranji Cam-Shaft castings are done.This may be due to the larger managerial unit.

Multi-product Plants and firms :

Forces behind it -

- 1) Changing Market Structure : It is believed that in perfect competitive market, the firms are single product firms and price is uniform. But now there is an element of - oligopoly in the markets, the firms have to produce range of products to compete with others or to survive. One of the - - reasons behind manufacturing variety of products is to adjust to change, to spread risk.The activity in the plant is - - - distributed between products whose markets are declining and those products whose markets are growing between highly - - profitable but seasonal or intermittant markets and steady selling but low profits markets, expanding when times are --

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good or exceptional opportunity offers, disposing of - - - subsidiaries or closing down on certain activities when times are bad."¹⁰¹

2) In order to get the economies of selling a number of products, through a single sales organisation.

3) To achieve security in a constantly changing - - world, to survive in changed and uncertain times.

4) The firms possessing liquid resources, fixed --- equipment, experience and good will, will enter into new line of activity. Such typical firms are ' multi-product' firm.

This multi-product step is achieved through, ' - lateral integration" i.e. lateral expansion of the firm in the direction of other different but broadly similar activity".

In Kolhapur, the reasons behind multi-product plant, firm or diversification is mainly 'Change in demand ' which has been expressed partially, as underutilization of capacities one -- reason of underutilization as noted earlier was due to - - - superfluous installation of capacities which could not - - - materialize due to shrinking market. Diversification is also

tried to improve the financial working and capture the market.

Ref:101: E.A.G.Robinson" Structure of competitive industry"

P.116.

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Underutilization may be due to two factors.

i) Declining demand for diesel engines is caused by other factors as studied earlier. 2) Many a times we find -- demand is there but it could not be fulfilled due to - - - - difficulties of raw material, finance, power, strikes etc. Both these statements are partly true and partly untrue.

Demand for diesel engines in Kolhapur might be slack, but the attempts and the success achieved in exporting the engines to other markets create some hopes to utilize and lengthen the production run. This reflects on the activities of the -- ancillaries. Their products are demanded. But they have to - face some difficulties, of raw material storage capacities to store them, finance. The small units face these difficulties more, as is revealed by various tables.¹⁰²

Relation between large (manufacturers) and small units (Component manufacturers.)

Earlier we have given the classification of - - - ancillaries according to their relations with manufacturers a - - - - -
Ref : 102 : Refer to tables given in the end. Table 22.

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1) Wholly ancillary 2) Open market 3) and mixed type of --
ancillaries.

1) Small units supply the parts to the manufacturers according to specifications given Accuracy in the job is -- achieved mainly through handwork 2) In return they are paid, but there are delays in payments. 3) The parent units -- - sometimes supply raw materials, designs, technical guidance, the ancillaries have to manufacture accordingly, there is separation between designing and manufacturing. These units get security of assured market. Kolhapur units depend on Poona, Bombay, Bangalore parents, like Kirloskar, Cooper, Ruston, Shri-Ram refrigerators, Mahindra and Mahindra, and the -- ancillary units depend on Kirloskar-Ghatage, Menons and -- Maharashtra Engineering corporation in Kolhapur also.

The component part manufacturers who are mainly -- small units supply parts to manufacturers, assemblers and to the 'Open market' also. There is keen competition among the part manufacturers and they are forced to sell at cheap price which is beneficial to the customer but loss to ~~that~~ the manufacturers.

Some difficulties - The parts are not according to -- -

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specification many times, so they are rejected. The rejection percentage is 20% it is told.

The part manufacturers fail to fulfil their commitments in time, there are delays in delivery.

The problem of finance has always existed. As they are proprietorships and partnerships, they find difficulty in raising finance. They fall in the range of 1 lakh rs.

Many a times bilateral exchange of intelligence is not possible.

The relation between manufacturers and small units is direct. The system of quotations by tenders or transactions through middlemen are not found in Kolhapur.

These are some of the difficulties faced by part-manufacturers, who are supplying components to Diesel engine - manufacturers. In spite of these difficulties engines are ----- manufactured to reduce the capital cost. The demand for engines is declining in Kolhapur. But the industrialists are trying to -- export the engines to foreign countries. In export markets they have to stand the competition in respect of prices. But it is

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said the costs of manufacturing diesel engine in India are 3-4¹⁰³ times more than in America. We can-not deny the fact that ---- engineering industry of Kolhapur has skilled artisans, but -- there is need to know the modern science, technology, marketing and management . " If products are quality goods, they should get a wider market outside, otherwise the firms should try to diversify the product. So that they can survive the recession.¹⁰⁴

Justification and objectives of diversification.

There are advantages and economies of scale, when the firms specialize in one production lines. But this requires continuity in demand. When demand is insufficient to allow --- specialization, then specialization is risky during recession - and slump. So the industry should diversify. When oligopolistic elements are seen in an industry, diversification becomes a -- necessity. Hence training should be given to the small producers in new methods and handling of sophisticated machinery. Public -

Ref : 103 : ' Manufacturing problems in Diesel engine '
Baranson.

104 : " Recession in Engineering industry in Kolhapur-
Nagalyya SIET Hyderabad.

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sector units should give them subcontracts. e.g. the proposed H.M.T. unit in Kolhapur is in right direction.^{104A}

If the modern firms have to grow and survive, -- diversification is proposed. " Diversification is most frequent in large firms. Concentration on a single product or a narrow - range of closely related products makes a firm more dependent on the fortunes of a single market area and thus more vulnerable to unexpected adverse changes. Diversification in principle, enables such risks to be pooled."¹⁰⁵

The ability to diversify depends on finance and managerial activity.

Mrs. Penrose's views are illuminating. According to her " When utilization is not exploited fully, the unutilized productive services must think of diversification. Unused ----- productive services are for the enterprising firm, at the same time a challenge to innovate, an incentive to expand, and a ---
-se- - - - -

Ref : 104-A : See in Appendix I

105 : " An Introduction to Industrial Economies"

P.J.Bevine, R.M.Jones N.Lee, W.J.Tyson.

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source of competitive advantage. They facilitate the introduction of new combination of resources innovation within the firm. The new combinations may be combinations of service for the production of new products new processes in the production of oil products, new organization of administrative functions.¹⁰⁶

According to Mrs. Penrose, " Diversification is the normal way in which firms grow, not merely a reaction to the saturation of their markets. A firm is said to diversify " ---- whenever, without entirely abandoning its old lines of products, it embarks upon the production of new products, including ---- intermediate products, which are sufficiently different from the other products it produces to imply some significant difference in the firms production or distribution programme.¹⁰⁷ " The firms diversify because the opportunity cost for old product is more than the new.

Ref : 106 : " An Introduction to Industrial Economics "

P.J.Devine, R.M.Jones etc. page. 187

107 : " An Introduction to Industrial Economics "

by P.J.Devine, R.M.Jones, N.Lee, W.J.Tyson

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Types of diversification :

1) Additional products within the firms existing technological bases and market areas. (2) Products involving the same technological bases but new market areas. (3) Products --- involving new technological bases but the same market areas. (4) Products involving new technological base and new market - areas."

The engineering industry can diversify the products on the basis of first three types. The study also proposed many items for diversification¹⁰⁸ We have already seen that agricultural equipments, can be manufactured in this industry. Component and spare parts useful for automobile and tractors also can be --- manufactured.

They key significance of diversification is that it " frees the firm from restrictions on its expansion imposed by

Ref : 108 : "An Introduction to Industrial Economics "

by P.J.Devine, R.M.Jones, N.Lee, W.J.Tyson

Page 137 .

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the demand for its existing products, although not from the restrictions imposed by its existing resources." 109

According to Mr. Nagaiyya, " Diversification means supplementing the existing production lines with other items which involve utilization of the existing machinery, skill and marketing set up built by the units with marginal additions. 110 Diversification should imply choosing additional items with the existing set up.

Background of Kolhapur entrepreneurs :

The sampled units surveyed pointed out that more than 60% of the workers working in the ' engineering --- industry ' are skilled technical personnel with long experience of work in the field of oil engines. " The light engineering industry transformed the artisans, skilled workers in ----- entrepreneurs." They can easily grasp the technique of ----- production. Earlier we have noted that the demand for oil ----

Ref : 109 : "An Introduction to Industrial Economics "
by P.J.Devine, R.M.Jones, N.Lee, W.J.Tyson ,
Page 188

110 : " Recession in engineering industry in Kolhapur "
Nagaiyya SIET Publication, Hyderabad.

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engines is declining more due to substitute products than other factors. Demand is declining not only, in Kolhapur but it is -- found wherever electricity is available.

The need for diversification becomes inevitable. The sooner it is realized the sounder will be the growth of the size of firm. The meaning of diversification should be understood in its proper perspective. Besides oil engines, other products that can utilize the services of given resources (plant machine) should be considered. The larger firms are in a position to --- diversify the products than the small units.

Point to be considered :

We have noted, that the firms differ in experience, entrepreneurial ability , " the doing of new things or the doing of things that are already being done in a new way," ^{110-A} investment, type of machinery, capacity, marketing channels, ability to --- incur additional costs, availability of raw material, finance - etc. It is only after considering these resources, selection of new production line will be advisable.

Ref : 110-A : "Private economic power in India " Asim

Chauduri Page 68. peoples publishing house.

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We come across many units who have changed their work instead of manufacturing new products. They prefer to work as ' repairers '.

Many units have entered into new product, new ---- markets, they rely on scientific research e.g. instead of ---- manufacturing water cooled, heavy engine of outmoded design one firm (Maharashtra engg. corporation) is thinking of ----- manufacturing ' air cooled ' engine. Diesel engines should be light weight, durable, portable and speedier. " We have seen -- Menons have already started diversification of products. These large units do not have much difficulty. But small production units have to face some difficulties in their way towards --- diversification.

Difficulties of these units :-

Even if these units overcome the difficulties of basic infrastructural facilities, they have to face other ---- difficulties. There are :-

- 1) Delays in payments of bills in time. Timely -- payment of bills by the party would enable the firms to take

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to diversification. Failing this even if the firms believe in diversification, they are handicapped on account of such delays e.g. in one case Mess. Rocket engineering, they could not get - their bill of rs. 6.50 lakhs from the Government of Bihar. The amount gets locked up . It took seven years to receive the -- payments. (2) If the aggrieved production unit thinks of filing a suit against the customer (here the Government of Bihar), the unit being small is not in a position to pay the stamp duty. (3) Other states insist that Kolhapur engines should get central Governments I.S.I. Quality mark. Even if Kolhapur units succeed in getting this I.S.I. mark by spending huge costs, their ---- engines are not given same price as is given to engine ----- manufacturers in large units. The explanation of this # ----- discriminatory treatment is given on the ground, that engines manufactured in small units consume much oil. The difference in the price given to engines manufactured in small units and that in large unit is of Rs. 1000 . The small units have to incur - loss on this unequal treatment. (4) If engines are to be sold to other state Governments small units are required to keep - deposits worth Rs. 25 thousand or 50 thousand. It is generally

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difficult for small units to go through these hurdles. (5) -- Diversification is justified on theoretical grounds, as well as the recent trends i.e. recurrence of recessions within shorter periods found in Kolhapur justify it. The difficulties faced in this are. (6) It takes two years to manufacture new products, and four or five years to send it to the market. Within these Six years, the firms have to pay rate of interest on capital -- borrowed, pay wages to the workers . It is beyond the capacity of small manufacturers . These difficulties have to be borne in mind before going in for diversification. The firms have to -- study the possibility of manufacturing new product with the help of installed machinery and, selling the product immediately to the market. Generally capital and market availability are serious constraints on the small firms. As is revealed by our survey , small units have stressed the difficulty of capital, guidance and markets.

Thus the small units are faced with the difficulties of 1) conditions laid down by other states, pertaining to ----
 1) deposits (2) I.S.I. mark, and (3) Discriminatory price ----
 4) electrification in Kolhapur district. *