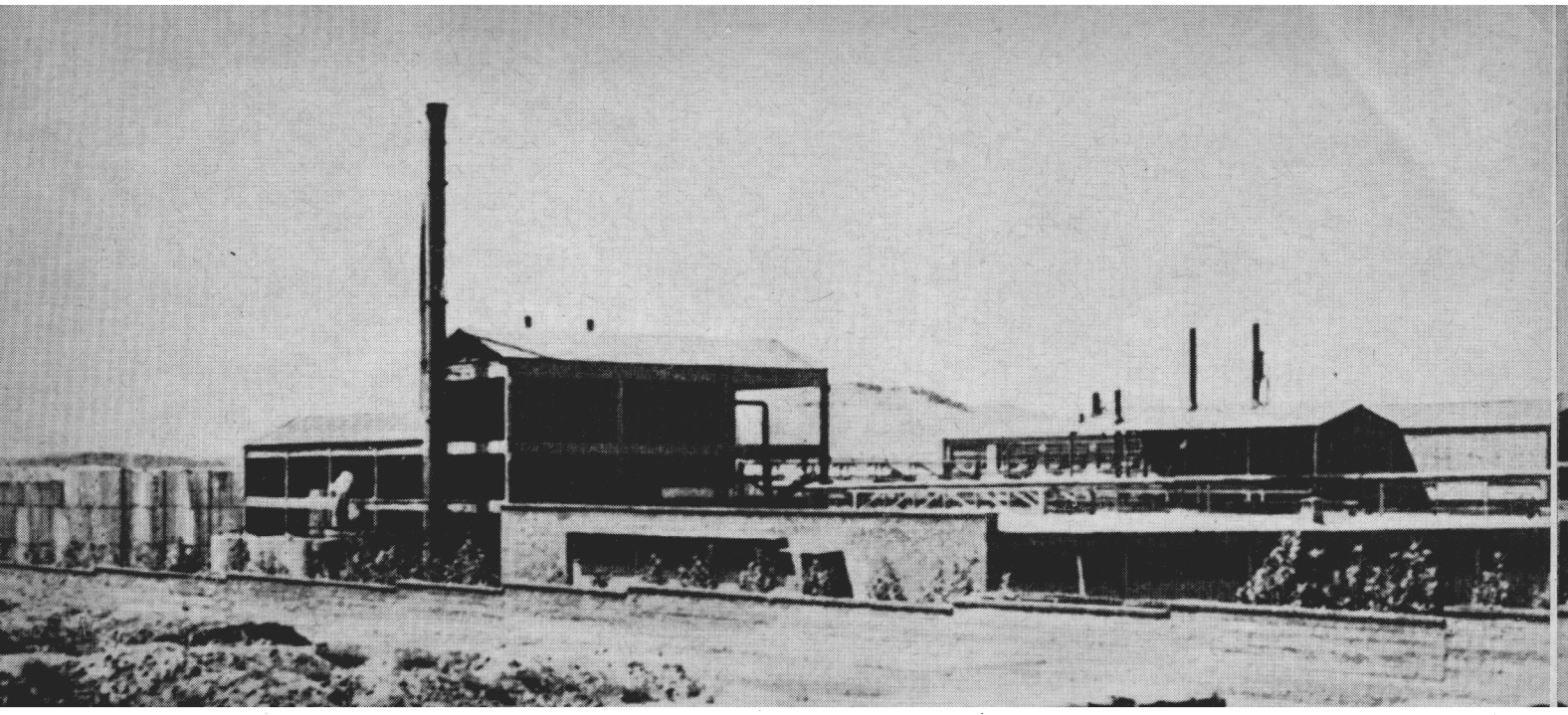


Teheran gets new, flexible

Plant can process either reduced crudes, mixed vacuum distillates, or slack waxes of any origin. A wide range of products conforming to international specifications can be manufactured.

BY A. S. KONSTAS
Athens, Greece

A NEW lubricating-oil refinery has been erected by Pars Oil Co. near Teheran and has been operating since June 1962. As shown in the flow diagram, Fig. 2, this refinery has been designed for these purposes, (a) to treat either reduced crudes or mixed vacuum distillates or slack waxes of any origin and (b) to produce all current qualities of lubricating oils and greases corresponding to the international specifications.

The total cost of the refinery amounted to about $2.5 million. Its capacity is about 25,000 metric tons of finished products per year.

Batch distillation in vacuum is considered to be the best system for the fractionation of the available feed stocks. This system has all the flexibility needed for the treatment of any feed stock and is able to make any possible separation. The distallation is carried out in vacuum and by injection of superheated steam.

The residue of reduced crudes is asphalt, while the residue of mixed vacuum distillates represent a base stock for heavy lube oils. Well-designed heating system and superheated steam injection avoids any cracking.

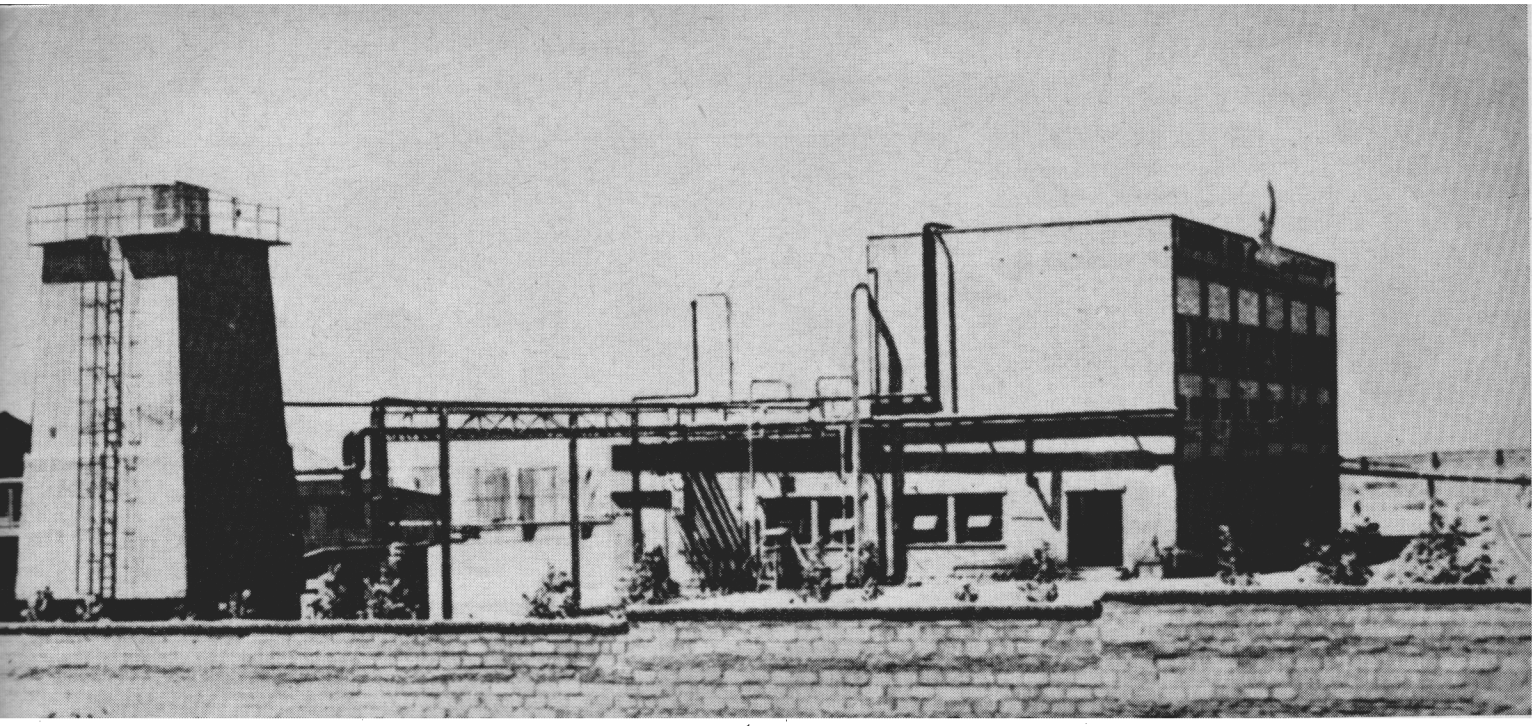
MEK—dewaxing and deoiling

Following distillation is the solvent dewaxing. The waxy distillates are dissolved, under strictly determined conditions of ratio, heating, and cooling, in a mixture of methylethylketone and toluene-benzene solvent. The oil-to-solvent ratio is 1 : 3 to 1 : 4. The final solution is carefully precooled in jacketed scraper coolers in countercurrent flow to the cold filtrate, and finally deep-chilled in similar scraper chillers by direct ammonia expansion to about 1–5°F. The chilled mix is filtered through rotating vacuum drum filters, the wax cake is washed with chilled solvent, repulped with fresh solvent, and refiltered and washed through second-stage rotating filters to eliminate any oil and obtain a practically oil-free wax.

The filtrate from the first filtration and the wax cake of the second filtration are distilled separately to recover the solvent. The evaporation is carried out in double-effect evaporation systems heated by exhaust steam and the oils and waxes are finally steam-stripped.

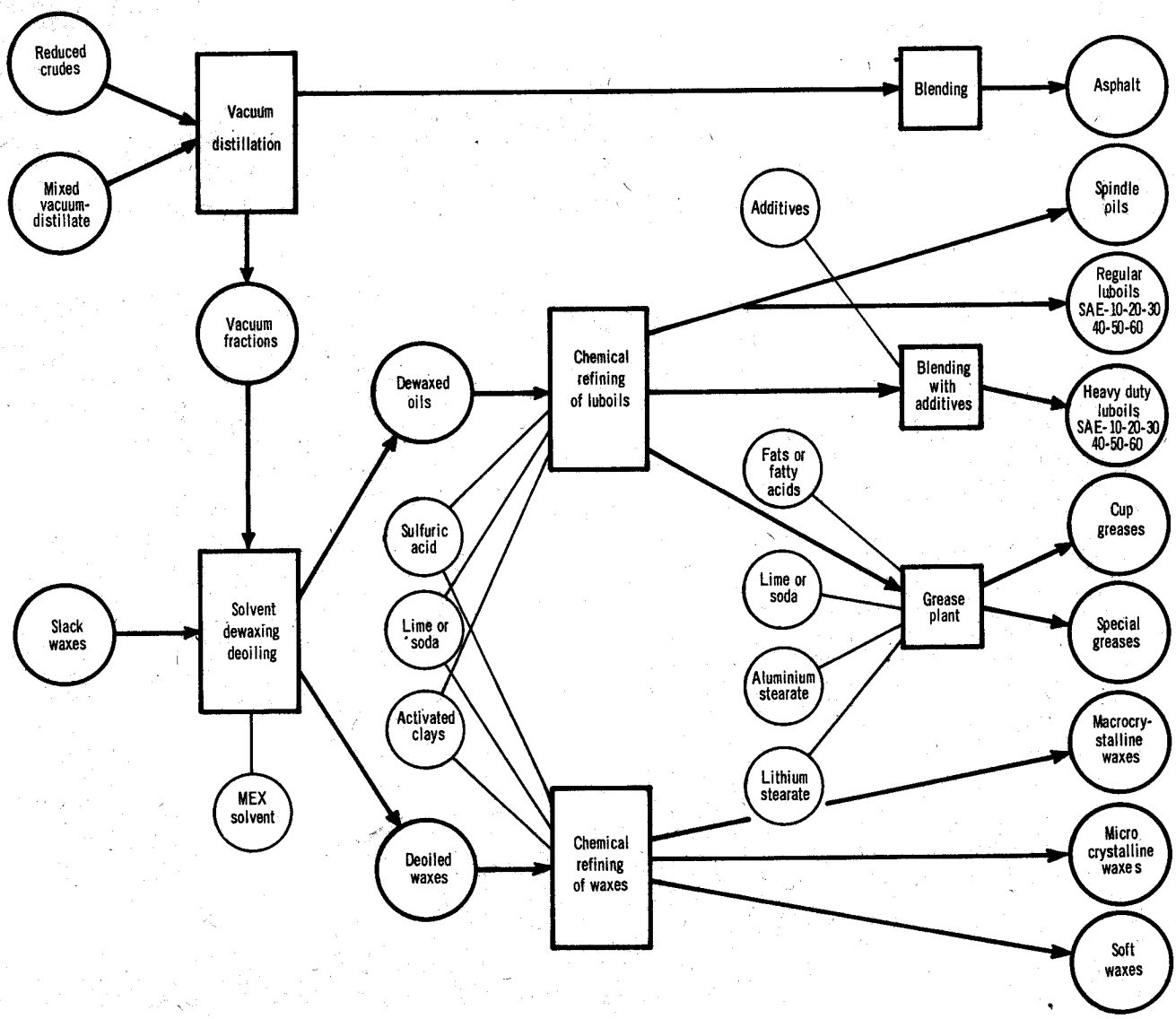
The process is similar to the process described by the author in a previous article[1] with many important improvements and the solvent evaporators are of the type described also by the same author[2].

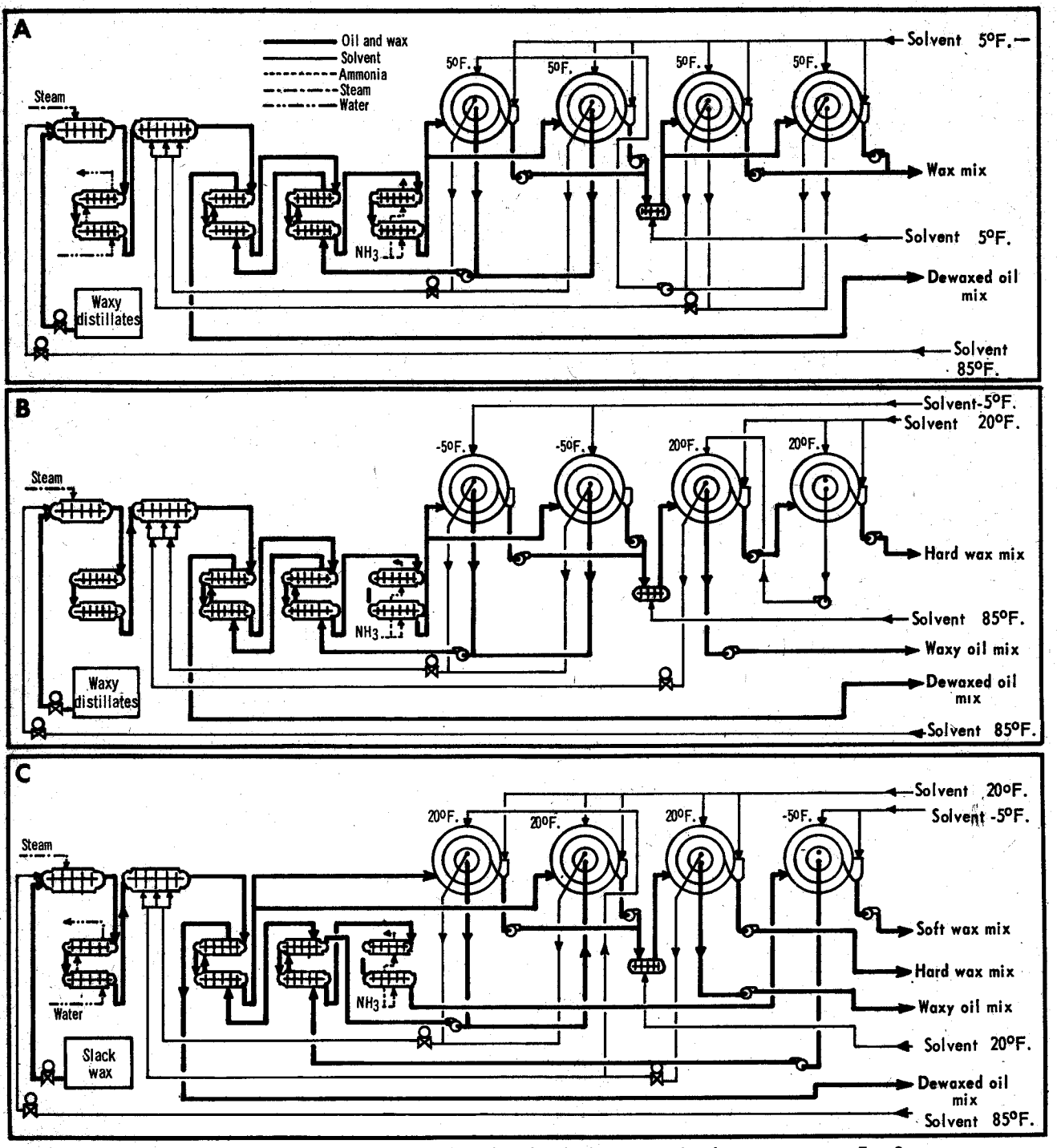
NEW LUBRICATING-OIL plant utilizes a variety of processes to make full range of oils and greases. Fig. 2.



FLEXIBILITY in treating feed-stocks is the watchword at Pars Oil Co.'s Teheran lubricating-oil refinery. Fig. 1.

lubricating-oil refinery





THREE PROCESSING SCHEMES can be used in the plant's dewaxing-deoiling operations. Fig. 3.

Deoiling

The solvent dewaxing unit can also be used for the deoiling of slack waxes. The operating procedure varies according to the feed-stock composition and to the qualities of the products to be obtained.

For example, the slack wax is dissolved in hot solvent, the solution is mixed with cold solvent to a final ratio of 1 : 8 to 1 : 12, cooled to about 50° F. and filtrede. The wax cake of this first filtered consists of soft wax. The filtrate is further chilled to about —5° F. and refiltered. This second filtrate contains the wax-free oil. The wax cake, which contains a small amount of waxy oil, is repulped with solvent of about 50° F. and filtered again, thus giving a high-melting-point wax (170° F.) and a filtrate containing a waxy oil.

This fractional treatment separates the slack wax by one continuous treatment into four products of different pour and melting points. The three simplified flow-diagrams of Fig. 3 represent three different operating ways of the dewaxing deoiling unit. Of course by changing the operating conditions many other combinations can be obtained.

The unit comprises four scraper coolers and chillers of about 3,500-sq-ft total surface; four rotating-drum vacuum filters of 1,100-sq-ft total surface; four separate double-effect evaporating systems and strippers; and azeotrope distillation dehydrating system and pumps, heat

exchangers, inert-gas compressors, control instruments, etc.

Control has been simplified by the use of special types of pumps with adjustable delivery, liquid-level controllers an thermostats for the chilling period. Complicated and expensive automatic control instruments, demanding a qualified personnel, have been avoided.

Chemical treatment

Dewaxed oils are refined by treatment with concentrated sulfuric acid and activated clays Owing to the variety of the oils to be produced, the clay treatment is carried out in batch operation under vacuum. Neutralization is obtained by adding of hydrated lime during the decolorization.

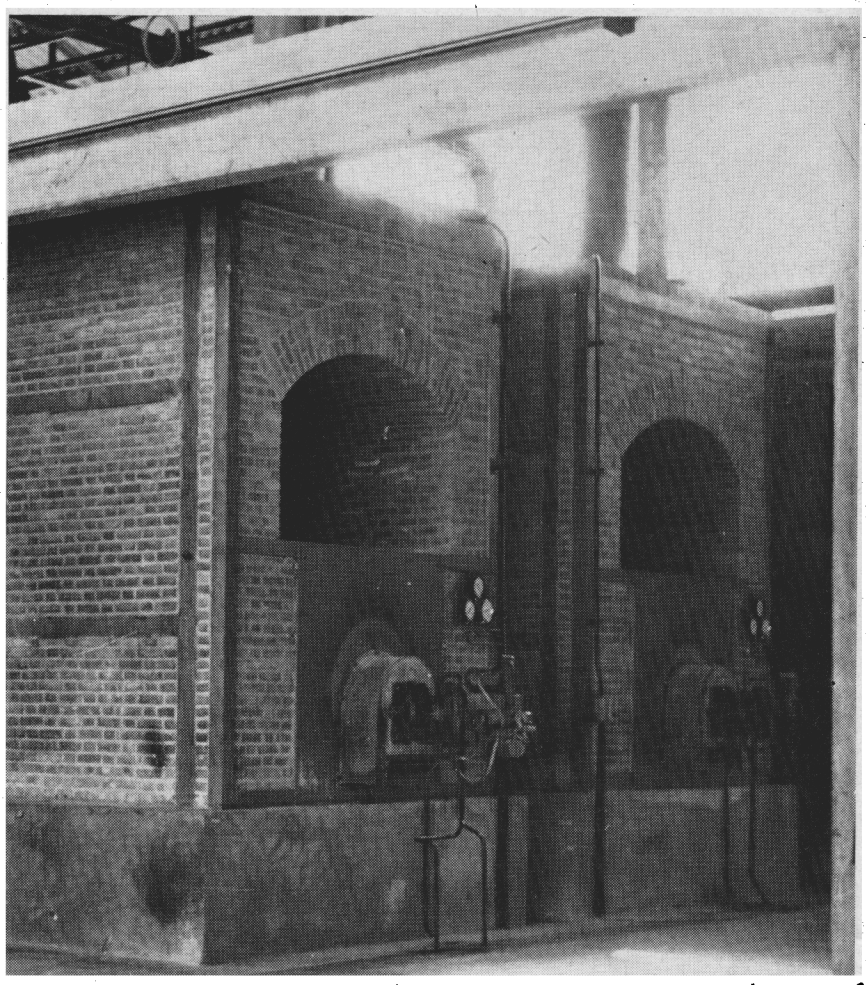
Waxes coming from the dewaxing-deoiling unit are also acid and clay-treated by the same way. Two main wax qualities are produced, a while macrocrystalline paraffin and a pale-yellow microcrystalline wax known as ceresin. The waxes are molded in shallow pans to slabs of about 20 lb each.

The lubricating grease unit is able to produce any quality of lubricating grease of calcium, sodium, aluminium or lithium base, etc. This unit operates independently from the other plant and is heated by a hot oil belt system.

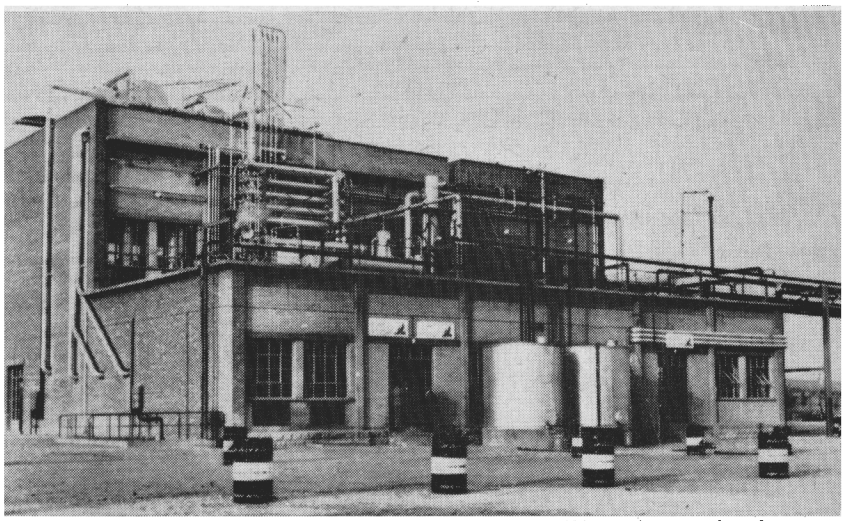
The available variety of Iranian feed stocks enables the refinery to produce any kind of base oils. A blending unit is provided for the production of standard types of lube oils and for the addition of special additives. Facilities for filling oils and greases by automatic filling machines in small cans or in plastic containers and for filling in drums are also provided.

Auxiliaries and facilities. Steam is supplied by a steam boiler producing 19,000 lb/hour, 260-psig superheated steam. Electricity is supplied by a 350-kw steam generator and the exhaust steam is used for all heating purposes. Three two-stage ammonia compressors of 400,000 Btu each supply the refrigeration for the dewaxing-deoiling unit. A water well giving 350 gpm and a cooling tower of 1,000 gpm cover the water needs. Tanks of various sizes for the storage of feed stocks, intermediate, and finished products have a total capacity of 21,000 bbl. Most of them are steam-heated and the yard piping are steam-traced.

A completely equipped chemical laboratory for the analysis of feed stocks and products according to ASTM methods, workshops, ware-



VACUUM DISTILLATION plays an important part in production of lubricating oil.



OIL AND WAX are important plant products. The oil must be dewaxed, and the wax must be deoiled in the equipment shown here.

WAX RECOVERY calls for chilling at low temperature and scraping the product wax from filters.

houses, canteen, administration offices, etc., have also been provided.

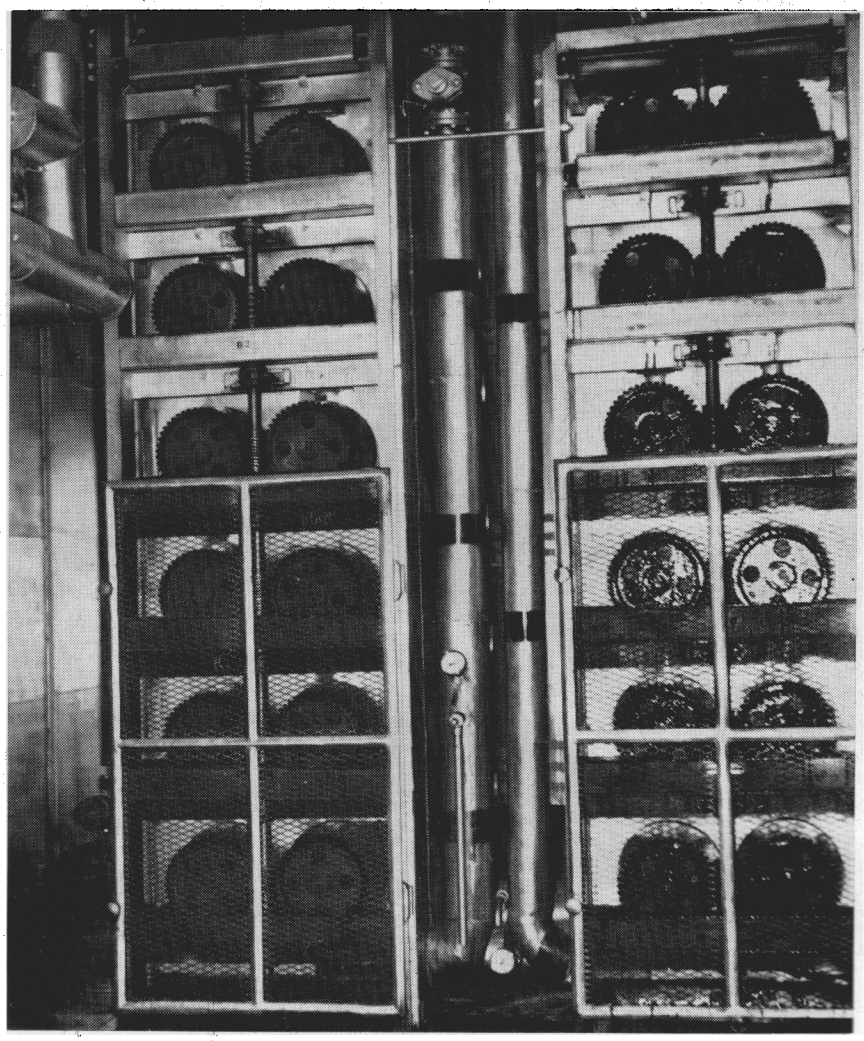
Design and erection. The refinery was designed by the author in Athens, Greece, and the main equipment was manufactured in Piraeus. The architectural study was also made in Athens. The rection was supervised and executed by Greek personnel.

The starting of the refinery and the training of the Iranian personnel was carried out by Greek engineers and technicians. Because of the severe climatic conditions in Teheran, outdoor installations were avoided.

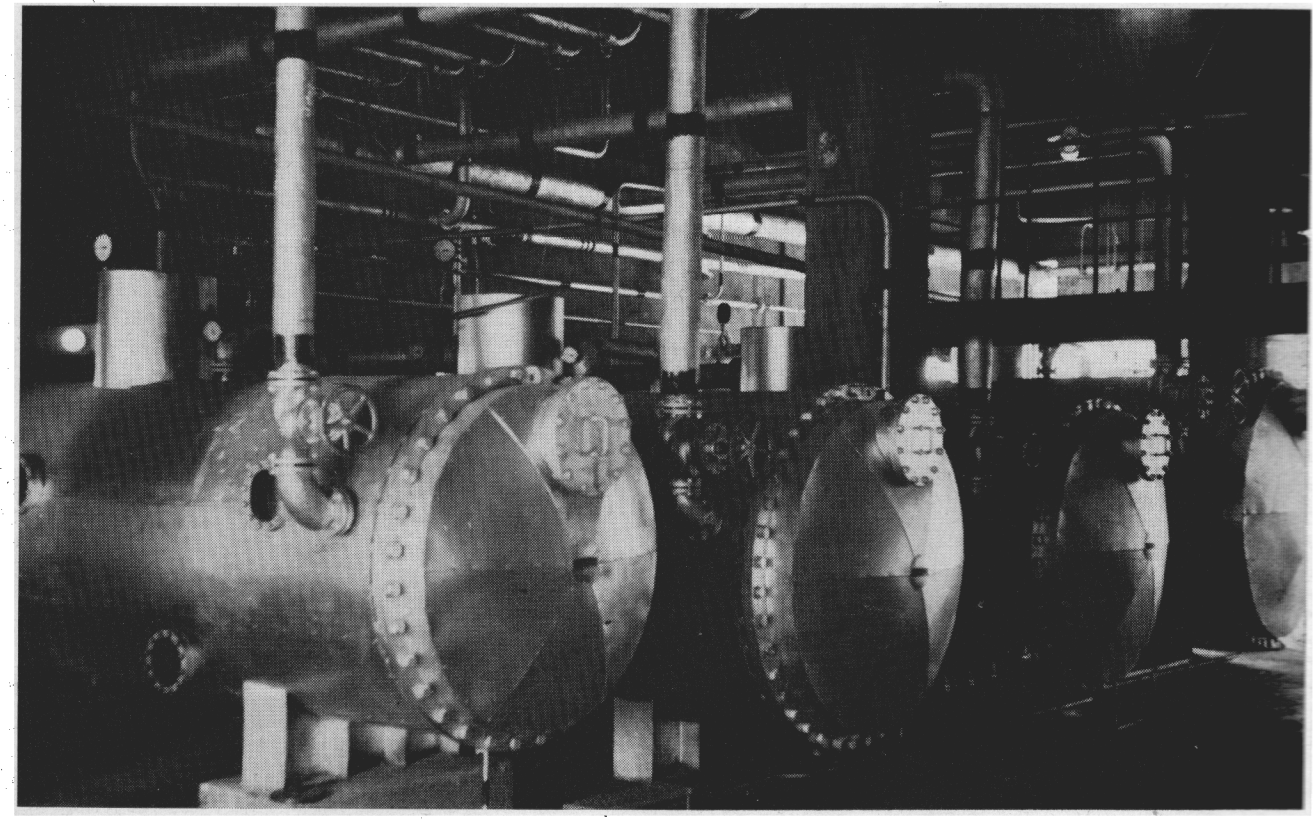
END

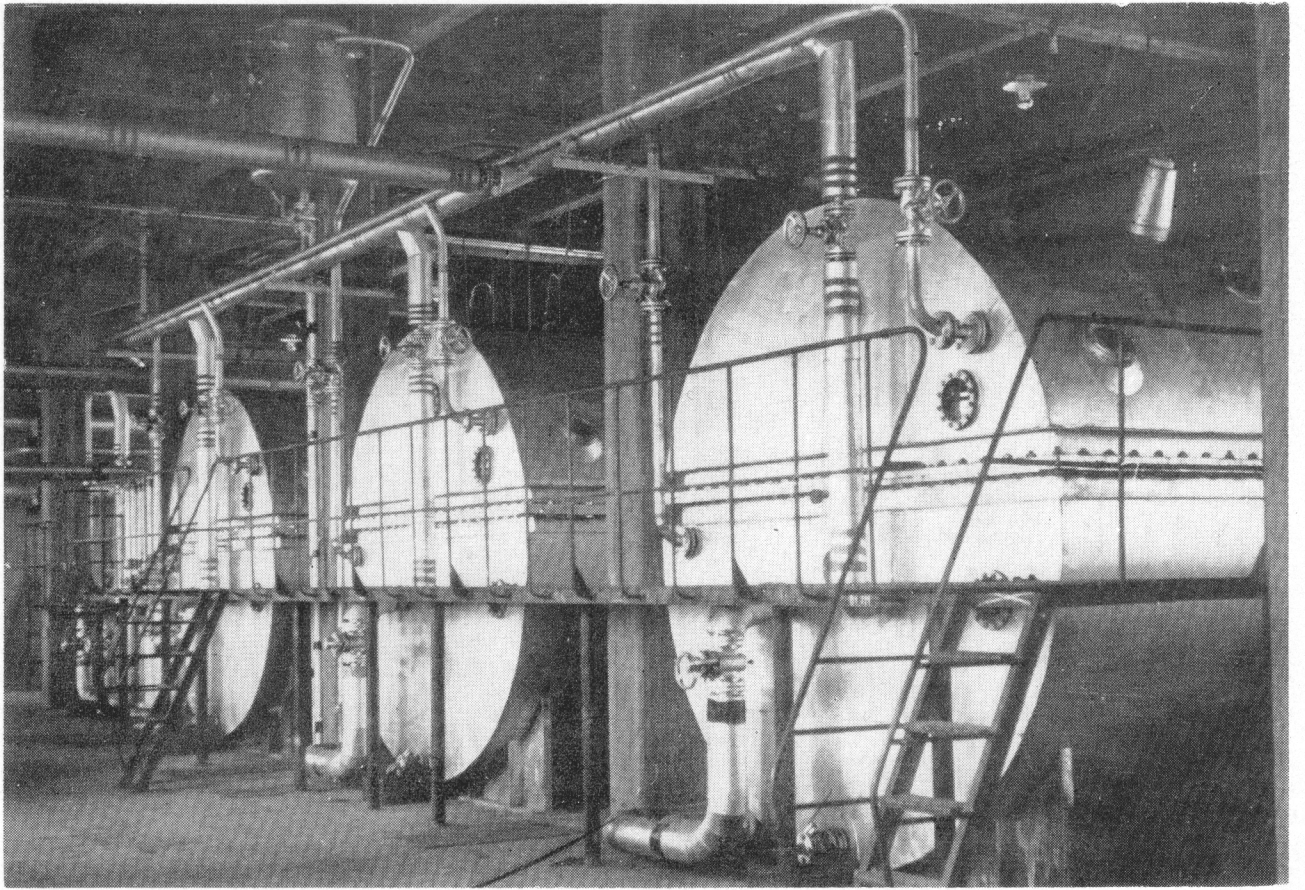
REFERENCES

1. Konstas, A.S., Petroleum Refiner, Sept. 1957.
2. Konstas, S.A., Chemie & Industrie, Génie Chimique, Juin 1958.



ROTARY vacuum filters provide for continuous recovery of wax from chilled oil-wax mixture.





ERRATUM. The last figure of the Reprint represents the SECOND STAGE SOLVENT EVAPORATORS. ROTARY VACUUM FILTERS are shown in the above figure.