

Chemical Fertilizer

RAPIDLY PROGRESSING CHEMICAL FERTILIZER PRODUCTION

**Development of a Unique Chinese Way
Through Technical Innovation**

Currently a great task of Chinese industry is to support agriculture, and the production of chemical fertilizer occupies an important place in this task. This year, as also last year, promises rich harvest of wheat; and chemical fertilizer is an important factor in this regard.

On the other hand, the export of fertilizer has always occupied the foremost place in Japan-China trade. Inasmuch as export to China amounts to 40 percent of the total Japanese export, Japan seems to be considerably interested in China's chemical fertilizer industry. Since chemical fertilizer was already dealt with in number 55 (November 1, 1965) of this Report, this issue will treat the major movements of this year.

During January-May, the Production [of Chemical Fertilizer] Increased 500,000 Tons Over [the Figure Set in] the National Plan.

This year, China's chemical fertilizer production progressed even further. During January-May, the daily output level of chemical fertilizer rose conspicuously above that of last quarter, which had had the highest level of last year; and overall 500,000 tons of chemical fertilizer were produced above the level set in the National Plan (a telegram dispatched by the New China [News] Agency on June 9, 1966). The quality of nitrogenous manure has been stabilized and the quality of phosphatic manure has been further elevated. The consumption of electric power, raw materials, and [other] materials is generally lowered and the cost of production decreased.

The nitrogenous manure produced in Shanghai during January-May this year shows a 40-odd percent increase compared with the same period of last year, and during January-February, Kuangchow City, too, produced nitrogenous manure 60-odd percent more than in the same period last year.

This year all -- large-scale, medium-sized, and small -- chemical fertilizer plants scattered in various districts of China have achieved a production increase through the movement of "bringing politics to the fore" and of studying the works of Mao Tse-tung, and are making new change in enterprise. Advanced plants are continuously maintaining a stable, high rate of production this year, and are making further progress; hitherto relatively retarded plants are rapidly advancing to catch up with the advanced ones; and thus great strides are being made in the over all production level. The new plants are rapidly reaching advanced engineering standards with a vigor to bypass all the others, and some of them are even ahead of older plants by breaking the traditional frame. For several years,

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a variety of technical innovations introduced by the Chinese chemical fertilizer industry has been all the more widely and systematically adopted, and unique Chinese production techniques, facilities, and management methods are bearing fruits.

Tanyang Chemical Fertilizer Plant Succeeds in Devising a New Chinese Way of Production Process

At the end of January, it was reported that the new nitrogenous manure production process, which had been successfully developed by the Shanghai Academy of Chemical Engineering, Peking Chemical Engineering Laboratory, and the Chiansu-sheng Tanyang Chemical Fertilizer Plant, after several years of research under the direction of an eminent Chinese chemist Mr. Hou Te-pang, was recognized as technically advanced and economically reasonable after a comprehensive technical examination conducted by the Ministry of Chemical Industry in accordance with the request of the National Science Commission.

Compared with traditional ones, this new process requires shorter production process, less materials and fewer facilities, less capital investment for basic construction, shorter working period for plant construction, and less consumption of raw materials [for generating] power. Judging from the example of the Tanyang Chemical Fertilizer Plant, the construction of a small plant with the annual production capacity of 5,000 tons of synthetic ammonia takes ordinarily about a year and a half and costs only 7 million Yuan of investment capital, which is approximately half of the capital needed for the construction of an old-process plant.

The bicarbonate of ammonia produced through this new process is a solid chemical fertilizer which contains only about 17.5 % of nitrogen; it is soluble in water, almost neutral, and harmless to the soil. Since it contains carbon dioxide, it is easily absorbed by the roots of agricultural crops and is advantageous to their growth. According to several years' experiments conducted by agricultural science authorities and the results of its application to large agricultural areas, this fertilizer, if used properly, has proved to be as effective as nitrogenous manure. The only problem is that since the bicarbonate of ammonia is easily soluble, relatively more precaution is required for its packing and use.

Application of the Tanyang-type New Process to Large Plants

Although this new process has been spreading among small plants of various districts, it is now being adopted for the construction of large-scale and medium-size nitrogenous manure plants. The view of the authorities is that although the adoption of China's new process in manufacturing bicarbonate of ammonia has already been making considerable progress, it would have to make further progress in order to meet the agricultural demand for nitrogenous manure. Consequently, research on various problems connected with bicarbonate of ammonia is currently being promoted more systematically, so that its production is further economically and effectively stabilized and its use is being made more rational.

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As for the Tanyang Fertilizer Plant itself, the projected production capacity for synthetic ammonia was 2,000 tons in 1963 (the actual accomplishment was 2,600 tons of synthetic ammonia, and 10,000 tons of bicarbonate of ammonia); in July 1964 the projected annual production capacity was raised to 5,000 tons for synthetic ammonia and to 20,000 tons for bicarbonate of ammonia; likewise in the first quarter of 1965 it rose to 6,500 tons and 26,000 tons respectively; and in the second quarter of the same year it made a further stride toward the level of 8,000 tons and 32,000 tons respectively.

China Tackles 70-old new Technological Developments This Year.

This year, new technological developments, for which throughout the nation chemical fertilizer plants are selectively promoting experiment and research by adopting the methods, the [internal] union of the three -- the leading management staff, engineers, and workers -- and the [external] union of the three -- the plants, scientific research organizations, and universities and professional schools -- amount to a total of 70 items.

These include new techniques for the shortening of the production process, simplification of facilities, and optimum utilization of local raw materials. Currently, those plants which have acquired these techniques are already reaping elementary fruits, and some are planning [to acquire these techniques]. It is deemed that the technical level of China's chemical fertilizer production will enter a new stage when these new techniques are accomplished.

The Gas Generator is the Neck of the Nitrogenous Manure Plant.

This year the popular movement for technological innovation and technological revolution has added further depth and breadth. Employees have made many revolutionary proposals on the neck of production and are effectuating production efficiency. In the production of nitrogenous fertilizer, the gas generator and compressor are the major facilities for manufacturing synthetic ammonia. Since last year, however, in nitrogenous manure plants everywhere, the production efficiency of the gas generator has not been able to keep pace with that of the compressor owing to the latter's overall elevation; and this has come to restrict the production increase of ammonia. The solution of this problem is indeed the key to this year's production increase. Therefore in order to cope with this crucial issue, the chemical fertilizer plants of various districts are propagating technological innovation through broad mobilization of masses.

Previously, the gas manufacturing workshop of the Nanking Chemical Fertilizer Plant operated according to old standards; and the coal-bed inside the gas generator was so low as to be easily blown off. As a result of earnest research, the technical staff of the factory concluded that the above facts were responsible for hampering production increase; after much experimentation, they discovered a new method of operation, that is, "high coal-bed, high wind-pressure, and high generator temperature." Since the

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adoption of this new method of operation for every gas generator in all workshops, productivity has risen more than 30 percent. The employees of chemical fertilizer plants of all districts have been raising the productivity of the gas generator by increasing the time for gas production with a minimum break of the generator. Currently, the goal of one compressor for one gas generator is realized in nearly every plant; some plants have "9 compressors for 7 gas generators"; and thus the production capacity of synthetic ammonia is being raised in all aspects.

Productivity is Raised Tremendously by Every Plant in Shanghai.

The large Shanghai Wuching Chemical Fertilizer Plant, which was built by China's own efforts, has been conducting continuous research to improve its facilities and manufacturing methods. As a result, its present productivity of ammonia is twice as high as originally projected production capacity. The present productivity of small chemical fertilizer plants scattered in the suburbs of Shanghai is ~~to~~ an annual production of 3,000 tons of ammonia as compared with the projected original capacity of annual production which was 800 tons of ammonia. For several years these chemical fertilizer plants have encouraged technological innovation and revolution, and have dug out the potential of their facilities. Since the second half of last year, the employees of these small chemical fertilizer plants have been breaking superstition more boldly than ever: they improved the synthetic towers which had been regarded as taboo and had been called the "tiger's tail." The leadership of the authorities of Shanghai City has selected experienced laborers and technicians from various factories and improved the factories one by one, making a concentrated attack [on superstition]. Presently in such factories as Chiating, Putung, Nanhui, etc., the productivity of the improved ammonia synthetic towers is generally 20 %-30 % higher than the originally projected level.

Reconstruction of the Old-type Ammonia Synthetic Tower.

As for the reconstruction of the old-type ammonia synthetic tower, the Thermal Engineering Study and Research Team of the Department of Power Machines of Chinghua University, which collaborated with a chemical plant in Ssuchuan-sheng, succeeded in developing a new method. This study team discovered that the low productivity of the ammonia synthetic tower of the fertilizer plant was responsible for the weakness of current chemical fertilizer production when it investigated the plant in 1963 in order to unite [study] with production. Thereupon the team began to tackle the problem of reconstructing the ammonia synthetic tower; and after a successful research, it went back to the chemical plant in Ssuchuan in order to work out a technical reconstruction of the synthetic tower in cooperation with the plant. At first, however, some staff of the plant held the view that it would be better to construct a new modern synthetic tower than to reconstruct painstakingly the old-style synthetic tower of 1940.

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Those professors and students of Chinghua University and the workers and technicians of the chemical plant who participated in this technical reconstruction work determined to open a unique way based on the reality and necessity of China. There is a considerable number of this type of old synthetic towers in China. If they can successfully reconstruct one old-type synthetic tower, the reconstruction of all old-type synthetic towers will be accelerated, and the amount of China's chemical fertilizer production will be raised. And this has a greater significance than constructing new synthetic towers of complex structure.

Reconstruction of Synthetic Tower Without the Help of Foreign Writings.

In this technical reconstruction, they discovered through their elementary research that the low productivity of old-type synthetic tower was due to an inadequate conductivity of heat. They tried to increase thermal conductivity according to a method described in a foreign book; however, after a realistic research, they realized that [with such a method described in the foreign book] they could not truly solve the problem of thermal conductivity related to this kind of synthetic tower. Thereupon, through a detailed analysis in accordance with the operating conditions of the old-type synthetic towers, they grasped the main contradiction of thermal conductivity and created a new method.

According to this new method, they set out the first technical reconstruction of an old-type synthetic tower, but the productivity did not increase much though thermal conductivity was strengthened. Some attributed this to excessively good thermal conductivity. Afterwards, however, they discovered through a research on the basic data that the productivity had not increased in spite of the increase in thermal conductivity because related problems had not been concurrently solved, and that the main contradiction upon adopting a newly-built reaction tower had already been moved to the related problems. Therefore they concentrated their efforts on solving the problems related to thermal conductivity. Thus through the second technical reconstruction, the daily productivity of this old-type reaction tower has come to bypass the advanced world standard.

Furthermore in summing up the practical experience of the two previous technical reconstructions, they discovered a structural defect which had not been completely solved even with the second technical reconstruction. Therefore more improvements were needed from structural point of view. However, no clues to the solution of this problem were found in current foreign writings. Yet they were all the more determined to achieve something which had never been done by foreigners, and in the end with the help of the wisdom of many they succeeded in devising a new structure. Thus at last in its productivity, the old-type synthetic tower of the 1940's has come to be ahead of the new-type synthetic tower of the 1960's and reached the advanced standard of the world.

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Old-type Synthetic Towers Throughout the Country Undergo Technical Reconstruction Through the Chinghua University Method.

This technical reconstruction was begun in May 1964 and completed in October 1965. As a result of the technical reconstruction, the productivity of old-type installation rose by more than 70 percent, and the quantity of ammonia production of the entire plants increased a great deal. This technical reconstruction, which is implemented together with a great repair work for the ammonia synthetic tower, requires no great deal of money, needs only a short period of production suspension, has a great effect upon production increase, and yet is easily diffused. Currently many synthetic towers of the same type throughout the country are adopting the reconstruction methods of this chemical plant, promoting a partial technical reconstruction; and although there is a degree of differences [among different towers], all of them are achieving success in increasing production. The joint conference of National Economic Commission, National Science Commission, the Ministry of Chemical Engineering, the Ministry of Higher Education, and the Chinese Academy of Science which convened around last February, confirmed the significance of this reconstruction method particularly for economic construction.

Some Technological Achievements of Small Plants Are More Advanced Than Those of Large Plants.

The aforementioned new process of the small nitrogenous manure plant with annual productive capacity of 2,000 tons, which was successfully introduced by Chiangsu-sheng Tanyang Chemical Fertilizer Plant, has been hardening its basis among small plants. These newly-built small plants have advantages in experimenting in new techniques of production because they are small in scale and easily movable. After succeeding in the experimentation of the new process, within the last several years, these plants succeeded in the creation of many new techniques and facilities by adopting the method of the "union of the three" both within and outside the plants, raised the technological standard of China's synthetic ammonia industry a step further, and made a significant improvement of the new process of chemical fertilizer production, which was devised for the first time by the Chinese. Presently some of the new techniques, manufacturing methods, and facilities which are widely adopted by small-size nitrogenous manure plants are already advanced more than those which are employed by large-scale plants. Since the scientific researchers of the engineering division of various districts have always been working closely with their employees in plants, any technical achievement obtained in the course of production has been immediately utilized for engineering. Thus they have been able to revise the engineering project for a small-type nitrogenous manure plant constantly so as to make it economically more rational and technically more advanced. At the present time, the small nitrogenous manure plant needs much less investment capital for its construction and its construction speed has become much faster than ever. It takes only half a year to build a

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small-size plant and eight to ten months for a slightly larger plant. The capital for the construction of such small plants is managed by each Sheng, and also the manufacturing of facilities, engineering, and installations, too, are solved by many Shengs and cities. Although until several years ago only a few industrially relatively advanced Shengs and cities were able to engineer and manufacture themselves a [complete] set of chemical fertilizer facilities, today most districts have an engineering organization and a professional engineering corps and are greatly reinforcing the manufacturing capacity for chemical fertilizer. Some Shengs are producing a set of chemical fertilizer facilities by a method of cooperative division of labor, organizing several tens or nearly a hundred medium-size and small-size local machine factories. Currently the main facilities for small nitrogenous manure plants are all self-supported in large districts or Shengs except several Shengs and autonomous districts.

Small Plants Occupy Eighteen Percent of Nitrogenous Manure Production.

During January-May this year, 20-odd newly-built small nitrogenous manure plants in China began production; furthermore, the construction of a group of small plants is being accelerated and they are expected to begin production one after another this year and next. When all these new plants begin production, the productive capacity is expected to rise far above the annual productivity of small nitrogenous manure plants hitherto possessed by China.

Since 1961, the productive capacity of small nitrogenous manure plants has been doubled almost every year, and the ratio of which the small plants occupies in the national total of nitrogenous manure production has increased every year: in 1961 the total amount of production by small nitrogenous manure plants occupied only 2 % of the national total; yet in 1965 it rose to 12.4 %; and this year it is expected to reach 18 % (a July 14, 1966 telegram from New China [News] Agency).

Improvement of the Quality of Phosphatic Manure and of the Utility of Phosphorite

The main task of this year in the production of phosphatic manure is to continuously raise the quality of phosphate and the utility of phosphorite powder. Although most of the phosphorite powders used at the phosphatic manure plants of various districts were of relatively bad quality and were low quality mineral powders, the quality of phosphate has been improved, and the ratio of the first-class phosphatic manure increased a great deal. The convertibility in phosphate production rose 3 % everywhere as compared with last year, and the phosphorite powder is more effectively used than ever. The products of Kunyang Phosphatic Manure Plant in Yunnan-sheng were traditionally of relatively bad quality and their convertibility was low. They used to think that they could not manufacture first-class products because of bad raw materials and facilities; however, this year, as a result of a socialist education movement, not only the first have been produced but also the convertibility has been tremendously increased. The instructors and students of the Chechiang Academy of Chemical Engineering discovered a new manufacturing

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method to increase the production of phosphatic manure through cooperation with the Nantung Phosphatic Manure Plant and with a related research unit. With this method it is possible to increase the effective content of phosphorus even with relatively simple facilities; furthermore, phosphatic manure can be shipped after 3-6 days of maturity, and it is unnecessary to build a large warehouse for maturation. With this method, the effective content of phosphorus becomes more than 20 percent.

The Movement of the Chemical Fertilizer Plants in Each Sheng.

Since the current situation of the medium-size and small-size chemical fertilizer plants up to last year has been introduced in the issue No. 55 (November 1, 1965) of this report, in the following the news from various districts which appeared this year is dealt with.

Hunan-sheng Chuchou Chemical Fertilizer Plant

Recently began its operation formally (New China [News] Agency, January 26, 1966). This large-scale modern plant with an annual production capacity of 200,000 tons of superphosphatic line was engineered and built entirely by Chinese; its facilities also are Chinese-manufactured.

Hubei-sheng

A small chemical fertilizer plant, which was newly built in Tienmen-hsien Hubei-sheng, has recently begun to produce bicarbonate of ammonium (New China [News] Agency, May 15, 1966). This plant can produce 12,000-odd tons of bicarbonate of ammonia a year.

Anhui-sheng

Four small recently-built chemical fertilizer plants in Anhui-sheng have formally begun production (New China [News] Agency, March 23, 1966). Including those plants which had been built prior to these four plants, there are now 12 small-size chemical fertilizer plants in Anhui-sheng, and 160,000 tons of chemical fertilizer can be produced annually by these plants. These four newly-built plants are scattered in the rich rice crop district of the southern bank of Chang Chiang (Yangtzu River), the Shih-hang irrigation area of Chianghsi Pi and the low food crop area of the Huaifei plain; they can produce nearly 30,000 tons of liquid ammonia and bicarbonate of ammonia a year. The engineering, construction and the training of technicians for these four plants were accomplished all by the assistance from old plants. Therefore their construction was so fast as to be completed and to begin operation generally in only 6-7 months, which was 3-4 months shorter than the original plan; and on the average each plant saved approximately 10 % of the investment capital originally planned; also the works were so magnificently performed that [every plant] succeeded in a single trial run.

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Kuangtung-sheng

A new chemical fertilizer ammoniated superphosphatic lime has formally begun to be produced by Kuangchou Nitrogenous Manure Plant. The facilities for this new fertilizer production were engineered, manufactured, and installed by the employees of the plant.

This year the Kuangtung-sheng Chinese Merchant Investment Company will construct ten chemical fertilizer plants in special districts, such as Shanshan, Meihsien, Huiyang, Chanchiang, Hainan, etc. Each of these plants will have an annual output capacity of 3,000-5,000 tons. Last year the company built the Meihsien Phosphatic Manure Plant, the Taishan-hsien Huachiao (Chinese Merchant) Chemical Fertilizer Plant, the Huichou Phosphatic Manure Plant, and the Kaiping Nitrogenous Manure Plant which has a projected annual production capacity of 25,000; and all of them are in operation.

A soluble phosphatic manure plant in Maoming City having an annual production capacity of 60,000 tons began to operate in early March; its daily output has become as much as projected; effective content of phosphorus is 18 % plus; and all are first-class products.

Although the annual production of the Hsingning General Chemical Engineering Plant was 400-odd tons of superphosphatic lime in 1960 when it was established, today its annual production amounts to 20,000 tons; most products are of qualified standard; and the cost of production is at three-fourths of the beginning period.

The first nitrogenous manure plant of the Special District of Shantou -- the Hsinghuo Nitrogen Plant -- began its operation formally on February 10, 1966. Its annual production capacity is 3,000 tons of synthetic ammonia (liquid ammonia 12,000 tons). The plant was built with support from many quarters and completed only in 8 months.

Yunnan-sheng

The five newly-built or expanded soluble phosphatic manure plants in Yunnan-sheng are beginning to operate one after another (New China [News] Agency, March 28, 1966). These are located in Hsuanwei, Chuhsiang, Yuchi, Chinning, and Anning; and when these plants formally commence their operation, this Sheng's production capacity of soluble phosphatic manure will be nearly tripled.

Chinghai-sheng

The first nitrogenous manure plant of Chinghai-sheng began production in Hsining on January 1, 1966. Prior to this, in this Sheng there were a phosphatic manure plant which utilizes the bones of sheep and cattle, and a chloric fertilizer plant utilizing water from a local salt lake. The new plant produces mainly liquid ammonia and bicarbonate of ammonia. Part of the facilities of this plant was manufactured by the machine industry of Chinghai-sheng, and the rest were made in Shanghai.

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A large-scale chemical fertilizer plant of China -- a great quantity of chemical fertilizer rapidly produced by the synthetic ammonia plant of the Lanchou Chemical Industry Company.

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A small chemical fertilizer plant built last year in a farm-village in Kunshan-hsien, Chiangsu-sheng. It produces 5,000 tons of synthetic ammonia a year, which are supplied to the people's communes of Kunshan and several neighboring Shengs. This kind of small chemical plant requires a small investment capital; its construction is fast; and its facilities can be manufactured at the medium-size or small machine factories within the Sheng. Also, since its products are marketed in its locality, the price of the chemical fertilizer is cheap, and the farmers are pleased.

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The chemical fertilizer produced by Kanshan Chemical Fertilizer Plant in Chiangsu-sheng. Since 1965, eleven small chemical fertilizer plants of this kind have been built in the staple food and cotton producing districts of Chiangsu-sheng.

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A small chemical fertilizer plant completed in the rice-rich Tangtu-hsien, Anhui-sheng. It took only 7 months from the beginning of construction to the commencement of operation.

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A corner of a newly-built small nitrogenous manure plant
in Tatung City, Shanhsi-sheng.

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CAPTION APPENDIX

Page	A precision grain balance manufactured by the Shanghai Scales Instrument Manufactory
	. . . . .	Precision balance, Model WT 2B manufactured by the Peking Optical Instrument Manufactory
	. . . . .	Precision balance, Model GT 2A manufactured by the Peking Optical Instrument Manufactory
	. . . . .	Chemical fertilizer production of the large synthetic ammonia plant of the Lanchou Chemical Industry Company
	. . . . .	A small chemical fertilizer plant in Kunshan-hsieng, Chiangsu-sheng
	. . . . .	Chemical fertilizer production of Kunshan Chemical Fertilizer Plant in Chiangsu-sheng
	A small chemical fertilizer plant in Tangtu-hsien, Anhui-sheng
	A small nitrogenous manure plant in Tatung City, Shanhsi-sheng

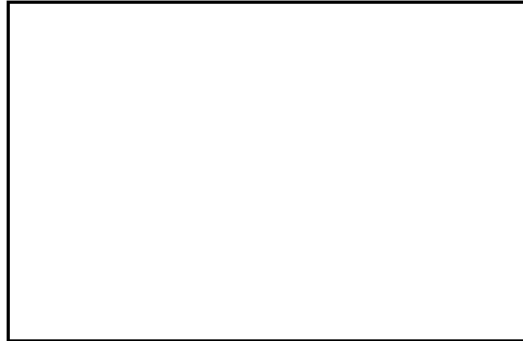
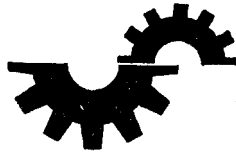
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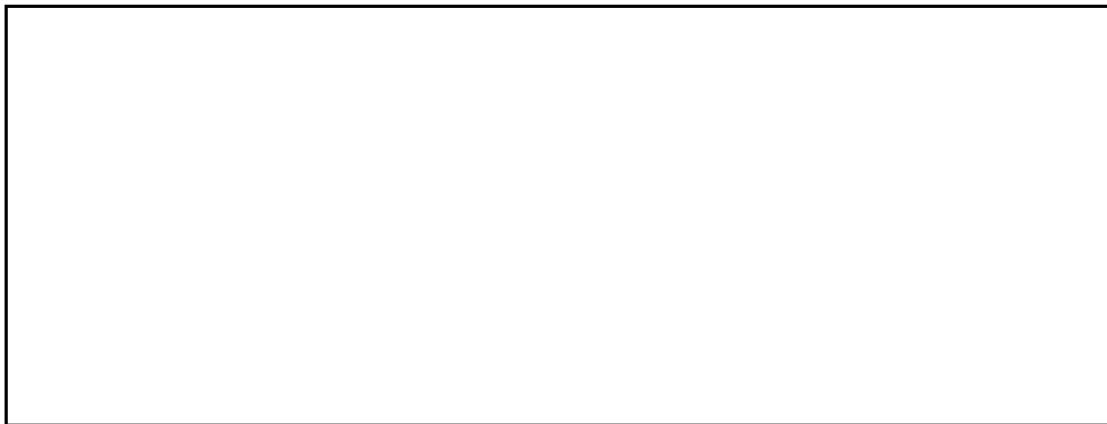


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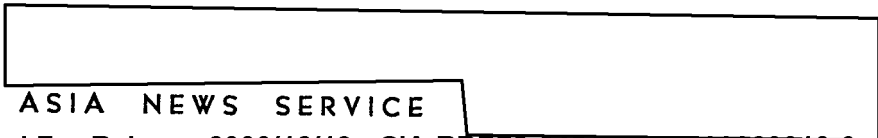


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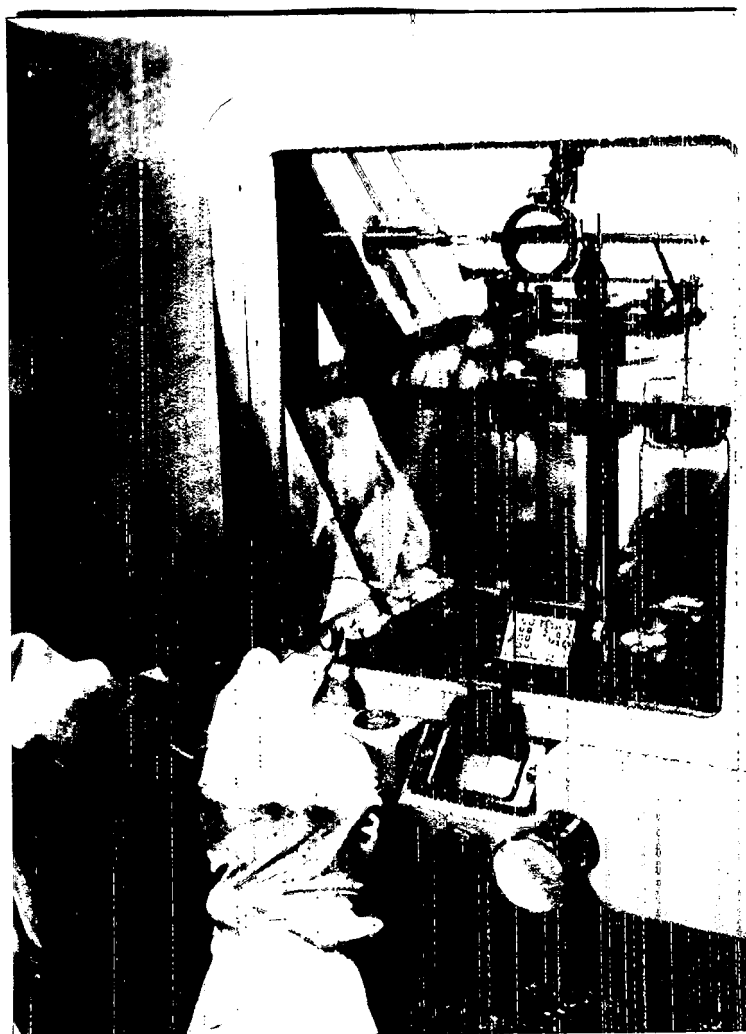
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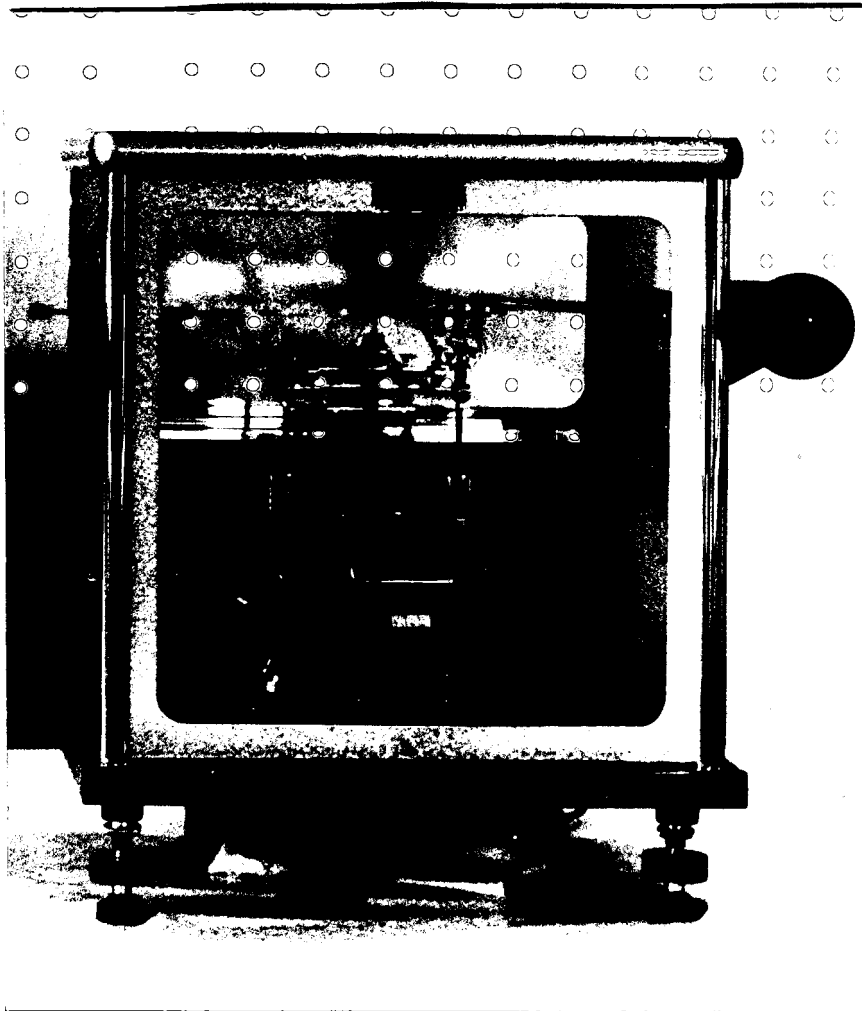
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