

USSR

speaks for itself

2
AGRICULTURE
& TRANSPORT

LW TWO SHILLINGS & SIXPENCE

08/11/57

10 p

U. S. S. R.
SPEAKS FOR ITSELF

VOLUME TWO

AGRICULTURE & TRANSPORT

LAWRENCE & WISHART LTD
2 Southampton Place, W.C.1

First Published September 1941

Printed in Great Britain by Crafton Press Ltd. (T.U.),
30-32 Brunswick Street, Leicester

CONTENTS

- 1 THE COUNTRYSIDE PAST AND PRESENT
By V. F. MOLYAKOV, Order of Lenin. Member of the Supreme Soviet of the U.S.S.R. Vice-Chairman of the Executive Committee of the Kalinin Region.
- 2 SCIENCE AT THE SERVICE OF AGRICULTURE
By N. TSITSIN, Order of Lenin. Member of the Academy of Sciences. Member of the Supreme Soviet of the U.S.S.R.
- 3 THE COLLECTIVE FARM (KOLKHOZ)
By F. KLIMENKO, Order of Lenin, Chairman of the Stalin Collective Farm, Genichesk District, Ukraine. Member of the Supreme Soviet of the U.S.S.R.
- 4 THE STATE FARMS
By P. LOBANOV, People's Commissar of the State Farms of the U.S.S.R. Member of the Supreme Soviet of the R.S.F.S.R.
- 5 MACHINE AND TRACTOR STATIONS
By A. OSKIN, Order of Lenin. Harvester-Combine Operator. Member of the Supreme Soviet of the U.S.S.R.
- 6 LIVESTOCK RAISING
By Y. LISKUN, Member of the Academy of Sciences of the U.S.S.R. Order of Lenin.

Over

7 RAILWAYS.

By V. OBRAZTSOV, Order of Lenin. Member of the Academy of Sciences of the U.S.S.R. Member of the Supreme Soviet of the U.S.S.R.

8 WATERWAYS AND WATER TRANSPORT

By A. BLIDMAN, Order of Lenin. Stakhanovite Stevedore.

9 THE MOSCOW-VOLGA CANAL

By A. KOMAROVSKY, Engineer. Order of Lenin.

I L L U S T R A T I O N S

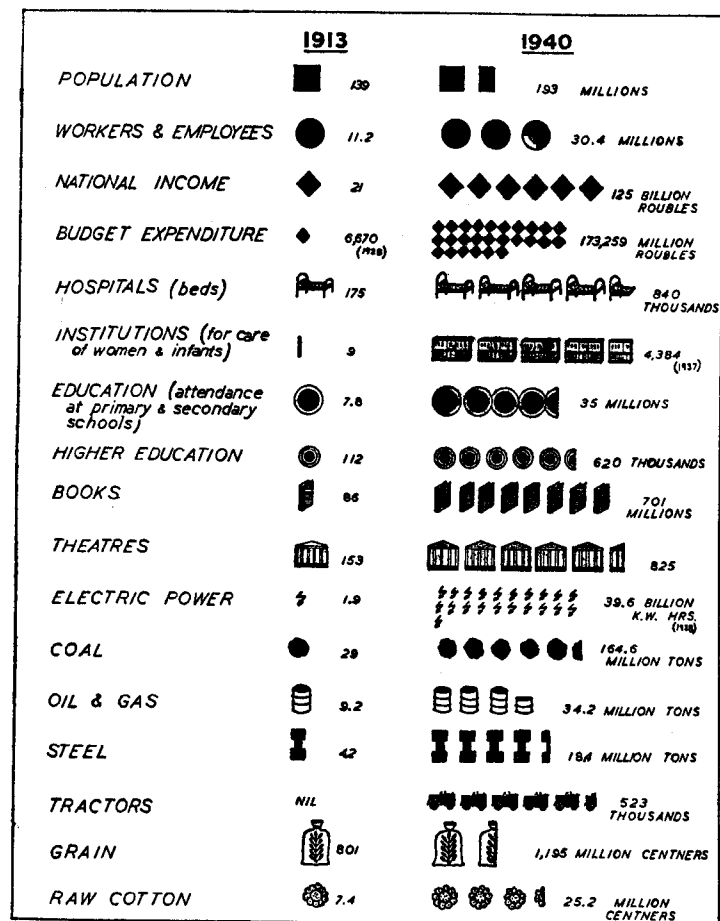
	<i>Facing Page</i>
COMBINE HARVESTERS	48
A COLLECTIVE FARM IN BURYAT, MONGOLIA...	49
KIRGHIZI'D IRRIGATION WORKS	32
A TRACTOR DRIVER	33
MACHINE TRACTOR STATION	64
A MOSCOW METRO STATION	65
A RIVER TRAM	80
THE MOSCOW -VOLGA CANAL	81

This series, U.S.S.R. Speaks for Itself, consists of the following volumes, uniform in appearance and format.

1. INDUSTRY
2. AGRICULTURE AND TRANSPORT
3. DEMOCRACY IN PRACTICE
4. CULTURE AND LEISURE

GROWTH OF THE U.S.S.R.

1913 figures are represented by one unit



The statistics on which the above diagram is based are those referred to in the Publishers' Note and are more recent therefore than the figures used in the various articles. The basic sources for the diagram are U.S.S.R. STATISTICS (Moscow); AMERICAN REVIEW ON THE SOVIET UNION (June 1941) published in New York by the American Russian Institute; the REPORT made by N. VOZNESENSKY to the 18TH ALL UNION CONFERENCE OF THE C.P.S.U. (B), February 1941, and since published as a pamphlet in English.

PUBLISHER'S NOTE.

DURING the last twenty years, hundreds of books about the Soviet Union have been published in England. Many of them have shown a sympathetic understanding of this great experiment in civilization, but many also have been marked by hostile prejudice, whether avowed or implicit. Only a very few have been the work of experts, qualified by training and experience both to observe and to report objectively; and, to whichever category they may belong, the great majority of books that have appeared have been written by foreigners.

It is therefore the special interest of the present series, *U.S.S.R. Speaks for Itself*, that all the articles have been contributed by Soviet citizens actually engaged in the work which they describe. Moreover in every case the author is a distinguished specialist in his subject, occupying a position of honour and responsibility in Soviet Society, sometimes as a member of the Academy of Sciences, sometimes as a member of the Supreme Soviet—and often enough as both. Thus in these four small volumes, *Industry, Agriculture and Transport, Democracy in Practice, Culture and Leisure*, we have a picture of unrivalled authenticity of the material and spiritual strength of our great ally in the war against Fascism.

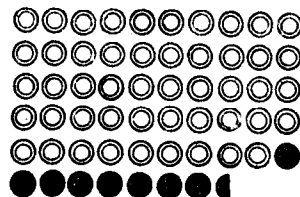
The articles were originally prepared as separate brochures in connection with the New York World's Fair, 1939, and the present volumes are only a selection from a very much larger number. At the time they were written two Five-Year Plans had been completed and the third had just commenced, but such is the tremendous rapidity of progress in the U.S.S.R. that already by the end of 1940 further huge increases in production had been achieved. In order therefore to bring the statistical material up-to-date we give below extracts from the report made on February 18, 1941, to the Eighteenth All-Union Conference of the Communist Party of the Soviet Union by N. VOZNESENSKY, the Chair

BUDGET OF THE

REVENUE

216,840,000,000 Rubles

Increase of 21% on previous year



TURNOVER TAX
on Industry and State and
Co-operative Trade
124,500 million rubles.



PROFITS TAX
31,000 million rubles.



**STATE SOCIAL
INSURANCE**
10,000 million rubles.



STATE LOANS
13,000 million rubles.



**INCOME AND
AGRICULTURAL TAX**
10,842 million rubles.



OTHER ITEMS
27,498 million rubles.

Each circle equals 1% or 2,168.4 million rubles.
Black circles denote increase over previous year.

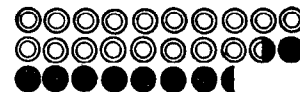
The basic source of this diagram is the speech by
U.S.S.R., made at the 8th Session of

U.S.S.R. FOR 1941

EXPENDITURE

216,052,000,000 Rubles

Increase of 23% on previous year



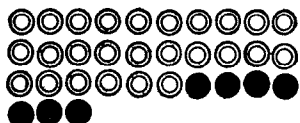
NATIONAL ECONOMY
New Factories, Mines, Elec-
tric and Power Plants,
Transport and Communica-
tions, Research, etc.
59,320 million rubles.



AGRICULTURE
Credits and Technical
Equipment to Collective
Farms, 387 New Tractor
Stations, Experimental Sta-
tions, Irrigation, etc.
13,580 million rubles.



**SOCIAL AND CULTURAL
SERVICES**
Education, Health, Pensions,
Protection of Mothers and
Children, Sanatoria and Rest
Homes, etc.
47,800 million rubles.



DEFENCE
70,900 million rubles.



OTHER ITEMS
24,452 million rubles.

Each circle equals 1% or 2,160.52 million rubles.
Black circles denote increase over previous year.

Zverev, People's Commissar for Finance of the
the Supreme Soviet in February, 1941

man of the State Planning Committee.¹ After giving details of industrial output in the first three years of the Third Five-Year Plan (1937-40),² Voznesensky continued:

"Railway freight carriage increased from 392,000 million ton-kilometres in 1939 to 409,000 million ton-kilometres in 1940. River-borne freight increased from 34,600 million ton-kilometres in 1939 to 36,000 million ton-kilometres. However, there are grave defects in the work of the railways; we still have irrational carriage of freight, which places an unnecessary burden on the railways, while the restricted traffic capacity of a number of sections and lines has not been eliminated.

"There has been an increase in the gross harvest of grain, sugar beet, sunflower seed, potatoes and vegetables. The grain crop of the U.S.S.R. in 1940 amounted to about 7,300 millions poods.

"In 1940 the increase in livestock in the collective farms was: large-horned cattle by 12 per cent, hogs by 15 per cent, sheep by 25 per cent, and goats by 34 per cent. Socialized collective farm animal husbandry is confidently increasing its share in the total head of livestock of the country. . . .

"The monetary incomes of the collective farms increased from 14,200 million rubles in 1937 to 18,300 million rubles in 1939. Preliminary data for 1940 indicate a further considerable increase in the incomes of the collective farms, in money and in kind, as compared with 1939.

"State and co-operative retail trade increased from 126,000 million rubles in 1937 to 174,500 million rubles in 1940.

¹In the other volumes of this series further extracts from the Report are given relating to the subject of the particular volume.

²For these figures see Volume I in this series: *Industry*, or the Report itself which is published separately.

"Thus, in spite of the hostilities on the frontiers of the Soviet Union in 1939 and beginning of 1940, the national economy of the U.S.S.R. has in the past year made a big stride towards the fulfilment of the Third Five-Year Plan, confidently gaining momentum from month to month. . . .

"I shall now pass to agriculture. The year 1940 was marked by the further consolidation of the collective farm system and the further progress of agriculture. Of the measures taken by the Party and the Government to consolidate the collective farm system in the past year, the most important are the following:

"*Firstly, measures to protect the socialized land of the collective farms from being squandered.* These measures nipped in the bud the tendency to allow free scope to private property relations in our countryside against which Comrade Stalin had warned the Party;

"*Secondly, the adoption of the system of calculating the amount of produce from tillage and stockbreeding to be delivered to the state on the basis of the number of hectares of land in each collective farm.* This decision has given a spur to the initiative of collective farmers in developing socialized farming, especially socialized stockbreeding in the collective farms;

"*Thirdly, the decision of the Central Committee of the C.P.S.U. (B.) and of the Council of People's Commissars of the U.S.S.R. relating to additional payment of the labour of collective farmers in the Ukrainian Republic for increased yields of agricultural and livestock produce.*

"These decisions and measures are historical in the matter of developing and consolidating the victory of Socialism in the countryside. They are helping to further and strengthen socialist agriculture. The role of planning in agriculture has also been enhanced. The indices

of the plan of crop yield and livestock productivity now acquire greater validity in connection with the additional payment of the labour of collective farmers who exceed these indices. Thus planning in agriculture has acquired a tremendous additional force. . . .

"The present war has revealed the tremendous importance of the transport services to the life of a country or people. No seapower, if it wishes to be independent, can dispense with a highly developed fleet and sea routes. But the U.S.S.R. is not only a sea power; it is—and this is more important—a big railway power. The importance of railways to the U.S.S.R. is just as great as the importance of a fleet is to a big sea power.

"In the last few years the Central Committee of the C.P.S.U. (B.) and the Council of People's Commissars of the U.S.S.R. have shown special interest in the needs of the transport services, and have done everything for their improvement. The hostilities in which the Red Army was involved at the end of 1939 and in the beginning of 1940 showed that in spite of individual shortcomings, our railway system successfully coped, and will undoubtedly be able to cope again, with the mobilization requirements of our Red Army."

THE COUNTRYSIDE PAST AND PRESENT

BY

By V. P. Molyakov

ORDER OF LENIN. MEMBER OF THE SUPREME SOVIET OF THE U.S.S.R.
VICE-CHAIRMAN OF THE EXECUTIVE COMMITTEE OF THE
KALININ REGION

OUR knowledge of the old Russian countryside is now limited to the art galleries, Russian literature and stories told by the older generation.

From Russian masters, Russian classics and living witnesses alike, we receive the same gloomy picture of tumble-down shacks, faces haggard with toil and constant under-feeding, bare-footed children in rags, a picture of squalor, ignorance, benightedness and drunkenness.

I remember the village of Bunkovo, in what is now the Krasnokholm District of the Kalinin Region, where I was born and bred. Here the majority of the peasantry had only two and a half acres of land per household, sometimes as little as one acre, while the lion's share of the best land belonged to big estate owners, the clergy and the kulaks. The land was tilled with wooden ploughs and harrows, so that, even in the best years, the peasants got only enough grain to last for six or seven months. The poor and middle peasants had no cows. Hunger drove them into bondage to tight-fisted kulaks who gave them scarcely enough to keep body and soul together.

Schooling for the children was out of the question. Schools were precious few and only the children of the well-to-do could attend

them. At the age of eight or ten, the children of the poor peasants were generally broken into heavy farm-work by their parents or were bound as farm labourers to kulaks for "bed and board" or packed off to the cities to "try their luck" there.

Such was life for the great majority of the peasants in my home region which was then called the Tver Province.

Thirty-six years ago a surveyor named Penkov came by chance to one of our villagers, Itomla. This is what he wrote: "I've never seen such ignorance and benightedness as there is in these parts. By local reckoning the nearest school is eight miles away but it must be a good ten miles. No ray of enlightenment penetrates this godforsaken hole and you would have a hard job finding anyone in the vicinity capable of signing his name."

In the autumn of 1897 the peasants of Staroye Kitovo got permission to open a school. They made the school furniture themselves and engaged a teacher. "There were twelve of us," says Ivan Kulikov, one of the "old boys," now a collective farmer, "and the school was held at each pupil's house in turn, for a week at a time. But the village priest took exception to the idea and at his request the school was broken up in January 1898, by order of the Chief Constable of the Novotorzhok township, and the village was left in the hands of the priest and the tapster."

In 1897, census-takers assigned to one area in the Moscow Province found that the village of Uskovo had mysteriously vanished. The story brought to light was as follows. The villagers were completely ruined. There was not the remotest possibility of their taxes being paid. Such being the case, Prince Dolgorukov, the Moscow Governor-General, ordered the village to be destroyed, the land to be given over to the crown. The police confiscated the peasants' belongings to the last stick of furniture and their houses were sold to the demolishers but even then there was not enough to pay the taxes. The villagers made a general exodus. Many of them died of hunger and exposure by the wayside. Gregory Krosh-

kin and his wife Praskovya hanged themselves, victims to the tyranny of the police and the estate owners. And so when the census came to be taken nothing was left of Uskovo but a heap of ruins overgrown with weeds.

In tsarist Russia 167,000,000 acres of fertile soil were in the hands of 28,000 big landowners, while 10,000,000 peasant families owned only 197,000,000 acres of land, much of it very poor soil.

Thirty per cent of the peasants had no horses, 34 per cent had no implements of any kind, and 15 per cent had no land at all to sow. For the use of a horse, plough or an extra patch of land the poor peasant had to apply to the landowner or the kulak, and sell himself to money-lenders.

After overthrowing the tsar in February, 1917, and the landowners and capitalists in October, the workers and peasants of Russia began to build a new life.

"1) Landed proprietorship is abolished forthwith without compensation.

"2) The landed estates, as also all appanages, the monasterial and church lands, with all their livestock, implements, farm buildings and everything pertaining thereto, shall be placed under the control of the volost Land Committee and the uyezds Soviets of Peasants' Deputies."

This decree was signed by Lenin on October 26, 1917, the day after the victory of the Revolution.

The Soviet Government began to help the poor peasants and middle peasants to put their farms in order, emancipate themselves from an age-old heritage of ignorance and extricate themselves from their poverty.

Primitive and laborious methods of cultivation in small detached peasant farms could never bring good harvests. The only way out was large-scale farming and mechanization. And so the Soviet Government called upon the peasantry to combine their small holdings into large collective farms. The first to respond and pool

their resources were the poor peasantry. The state supplied them as far as possible with machines, implements and seeds.

Seeing the advantages of collective farming, the results of improved cultivation by labour-saving machines, the middle peasants too began to join the collective farms.

The spread of collectivization was especially rapid in 1929 and 1930 after the Soviet Government had repaired the ruin caused by the imperialist and civil wars and began to industrialize the country. First-class, high-powered machines poured into the countryside.

The progress and triumph of collectivization can be seen from the following :

	1929	1930	1934	1938
Number of collective farms	57,000	85,400	233,300	243,300
Number of peasant households united in collective farms	1,000,000	6,000,000	15,700,000	18,800,000
Percentage of households collectivized (in proportion to the number of households)	3.9	23.6	71.4	93.5
Percentage of sown area collectivized (in proportion to the sown area)	4.9	33.6	87.4	99.3

Article 8 of the Constitution of the U.S.S.R. declares:

"The land occupied by collective farms is secured to them for their use free of charge and for an unlimited time, that is, in perpetuity."

The collective farms work to a set of rules in which the public interests in the collective farms are co-ordinated with the personal interests of the collective farmers.

In these rules it is explicitly stated that socialization applies only to the land and the means of production—horses, implements and machines. Cattle sheds, stables and other farm structures, clubs and the various subsidiary establishments are public property and used collectively. The family house, personal belongings, domestic animals and poultry remain the property of the respective collective farmers. The collective farmers also have plots for their own personal use, in which they are free to grow vegetables and fruit, or whatever they like.

According to the census of 1910 there were 10,000,000 wooden ploughs and 17,700,000 wooden harrows in use on the peasant farms of Russia. Now state-owned machine and tractor stations have been organized for the service of the collective farms. By 1938 the collective farms and state farms were employing 483,500 tractors aggregating 9,256,200 h.p., 153,500 harvester combines, hundreds of thousands of tractor-drawn ploughs, seeders, scarifiers, compound threshers and a host of other farm implements of the latest type.

Before the Revolution of 1917, Russia collected an average harvest of from 65,000,000 to 80,000,000 tons of grain, much of which was exported at that, and the peasants lived on the verge of starvation.

In 1937, the grain harvest in the U.S.S.R. totalled 120,290,000 tons. The collective farmers have not only plenty of grain for themselves and their families but have a considerable surplus which they sell to the state and the open market.

In the village of Bunkovo, mentioned above, a collective farm was organized in 1931, under the name of "Krasny Kolesnik" ("Red Wheelwright").

The peasants signed up of one accord. A general meeting of prospective members elected a board of management and I was elected chairman of the collective farm.

It was an uphill business until we got used to it. The members

had had no previous experience in large-scale farming and were often at a loss what to do. But we persevered until we got things running smoothly. In the same year, 1931, the state organized a machine and tractor station in our district, and tractors, compound threshers and reapers appeared in our fields. This machine and tractor station serves the other collective farms in the Krasnoholm District. Over 90 per cent of the population in this district consists of collective farmers and their children.

The members of our collective farm are divided into groups or brigade under its leader works in a particular department of the brigades. Often the brigades are sub-divided into teams. Each farm as the management directs, in the fields, the market garden, the orchard or the stock farms, as the case may be for each type of work a certain standard of performance is fixed which the collective farmer can fulfil in a day's work without any strain. This counts as a "Work-day-unit." Many farmers by properly rationalizing their methods of work earn two and three units a day. Each collective farmer is given an advance in money or in kind before the final settlement.

Our village has changed beyond recognition. New collective farm cottages have been built in place of the wretched hovels that used to be. There is a radio set in every home.

Livestock is kept in two large and well-built steads. The collective farm has acquired a horse thresher, two self-delivery reapers, two mowers, several horse rakes, two seeders, a potato-digger, a complete set of machines for cleaning seeds and a flax-brake. Every member of the collective farm (kolkhoz) has enough money and grain for his needs. Every family has a cow and, with few exceptions, sheep, pigs, chickens and geese.

Nurseries and playgrounds have been organized where the children are looked after by nurse-maids until their mothers come home from work.

Bunkovo is an example of the modern, enlightened Soviet vil-

lage. Eleven of the local peasants have graduated from technical colleges, twelve more are studying in institutes and training schools. All children of age go to school. Lorry-drivers, mechanics, harvester-combine operators and tractor drivers were unheard of in the countryside. Now they are met with everywhere. The collective farmers study scientific methods of agriculture.

All this makes for good harvests. In 1937, for instance, Kharitina Molyakova with a group of women farmers collected eight cwt. of flax staple to the acre.

The government took note of the good work of our collective farm and awarded me the Order of Lenin, as the chairman of the board of management. Later I was made director of the machine and tractor station and now I am in charge of the agricultural work of the whole Kalinin Region as the head of the regional land board. In 1937, the people of the Bezhetz Constituency (Kalinin Region) elected me to the Supreme Soviet of the U.S.S.R.

Itomlya, so forlorn and benighted in the past, now has a secondary school with accommodation for 450 children, a collective farm club auditorium seating 800 people, a hospital and a maternity home. There is also an experimental farm and several veterinary establishments.

This village alone boasts as many professional people, mostly of local origin, as there were in the three neighbouring rural districts or *volosts* before the Revolution. Itomlya is connected with the city of Rzhev (30 miles away) by telephone and automobile. And the radio connects it with the world at large.

In Staroye Kitovo, which was once deprived of its sole enlightening influence through the interference of the village priest, an elementary school and a secondary school have been built.

There is not a single illiterate person in the village. Every householder takes in a newspaper. There is scarcely a house without a radio set and a home library.

Cherneshchina is another thriving collective farm village. The

"Iskra Kommunisma" Collective Farm has a flour mill driven by an internal combustion engine, an oil mill, stables, a piggery, several granaries and a dairy farm.

There are three other collective farms like it in the same village, which has four clubs, several lending libraries and nurseries. A fair number of the peasants have become intellectuals, working locally as school teachers, doctors, agronomists and stock-breeding experts.

The same progress is to be noted in all parts of the country. Take Malgeli, a village in the Lenin District of North Kazakhstan, which was one of the most poverty stricken, uncivilized and blighted spots in the old Russian empire. The whole population lived in ignorance and drudged for the bey. Now this village is noted for the prosperity of the local collective farm ("Enbek"). Last year the work-day-unit worked out at 100 pounds of wheat. The collective farm grazier Beissembayev earned 90 tons of wheat and 3,200 rubles cash. The collective farmers have built themselves decent houses. Two hundred and sixty children are attending elementary school, and scores of others are at the secondary school and vocational training schools.

As for Uskovo, so ruthlessly razed to the ground by the tsarist authorities, the Soviet Government helped the villagers to rebuild it and settle down again. The prosperous "Novaya Zhizn" Collective Farm has risen where the ruins used to be. Fine wheat grows in the fields that were choked with weeds. There are no illiterate people in the village. Collective farmer Vasili Krupin has three sons working as engineers. Gerassim Moiseyev has sons in the Air Force and the Tank Corps.

At Vozhgali, a village about forty miles from the city of Kirov (Vyatka, as it used to be called), there is a collective farm named "Krasny Oktyabr." The peasants who organized it were natives of Chokota. This village had had so many gloomy associations for its inhabitants that they decided to make their fresh start some-

where else. So they abandoned their mean, tumble-down hovels and settled in Vozhgali. And within a few years they made it a flourishing settlement of two-storey houses, a centre of highly-developed collective farming.

And if you should meet any of the "Krasny Oktyabr" school children, try to persuade them that their fathers and grandfathers lived without electricity, radio sets, tap-water, without a collective farm bath-house, without electric kettles and electric irons, without musical instruments and motor trucks. They simply won't believe you.

This collective farm has its own theatre, park of culture and rest, and a sports ground with a tower for parachute jumping. In the winter time the collective farmers relax in turn at a splendid rest home which stands in a densely wooded park, on the verge of a miniature lake. Other forms of recuperation are no novelty to the members of the Krasny Oktyabr Collective Farm. In many homes you will find photographs showing your host or hostess holiday making in the Caucasus, or taking a rest cure at Kislovodsk.

One involuntarily looks back on the old Russian countryside and its facilities for "rest and entertainment." After a gruelling week's work the peasants would go to church and from there to the drink-shop to drown their sorrows and forget their wretched existence. Then they would stagger home, making the night hideous with raucous songs, some to sleep, others to beat their wives and children black and blue, the only method they knew of "letting off steam."

Often enough the "revellers" themselves came to blows in bitter contest as they remembered old wrongs, old disputes about one man's miserable wooden plough encroaching on another man's miserable plot of land. Among the popular "sports" of the time were fist-fights between villagers and two streets in the same village.

These hostilities were commonly instigated by the vodka dealers as each "combatant" required a good stiff drink before going into battle.

Now take a trip some evening to the collective-farm village of Ripsha, Smolensk Region. The loud puffing of exhaust steam from the power station greets your ears. Pleasant harmonies steal from the brightly-lit windows of the house of culture. A young collective-farm virtuoso is playing Schubert's "Moment Musical" on the accordion. In the next room half a dozen collective farmers face half a dozen others across chess boards. Pages can be heard rustling in the reading-room. Some team leaders have gathered for their class in agricultural science.

Go to Torzhok some evening, a country town in the Kalinin Region, and count the farm wagons and automobiles as they draw up at the local theatre. The collective farmers are coming from the surrounding villages to see *Romeo and Juliet* or some other attraction.

I could mention hundreds of villages like these. I have purposely taken the average collective farms for my examples of modern life in the Soviet countryside. But there are collective farms far richer than those I have mentioned. Many of them count their incomes in millions of rubles.

The Soviet countryside, Soviet country life have changed beyond recognition.

The right of citizens of the U.S.S.R. to education is written in the constitution. In the Soviet Union, universal elementary education for children is compulsory and you will not find a single village where children have no opportunity for education.

Furthermore, every child who has been through elementary school has the opportunity to continue his or her education at a secondary school in the same locality. A large percentage of the secondary-school children enter the institutes of higher education and technical colleges. During the Third Five-Year Plan period

seven year secondary-school education will be made universal in the countryside and the number of high schools will be greatly increased.

Clubs, theatres, moving-picture houses, reading rooms, "Red Corners"¹ and houses of culture, sports grounds and stadiums, aeronautical clubs, laboratory rooms and old folk's homes are becoming part and parcel of the collective farm village. Even now, quite a number of collective farms have their own rest homes.

In the Russian Soviet Socialist Republic alone we have at the present time 41,000 reading rooms, about 20,000 collective farm clubs, over 50,000 "Red Corners," about 2,000 houses of culture, 7,075 village libraries, 2,240 district libraries, and 2,336 kindergartens. During the summer of 1938, the playgrounds organized for the duration of the farming season accommodated over one million children.

We find the same picture in all parts of the U.S.S.R.

Many collective farm villages have theatres. Dramatic, musical and literary societies have been organized in every collective farm club. The sports galas held at the stadium in the village of Chapayevka, Kiev Region, are famous all over the country. The aeronautical club in Ukhovlovo District, Ryazan Region, has turned out no small number of first-class air-pilots and parachute jumpers of both sexes, trained in their spare time.

Before the Revolution the peasants were "doctored" for the most part by quacks and charlatans of every description. Children were brought into the world by ignorant old women. Only in rare cases was a feldsher² available.

But now, even a splendid hospital like the one at Nashchekino, a village in the Smolensk Region, complete with a therapeutical, surgical and obstetric department, is no novelty in the countryside.

¹ Recreation rooms.

² Feldsher: A medical practitioner of limited authority, primarily for first aid.

Now there are about 15,000 clinics in the countryside and about 23,000 medical stations. X-ray and physio-therapeutical rooms have been opened in large numbers.

Every year the People's Commissariat of Public Health issues a large number of health resort tickets to the collective farms. By decision of the government a new contingent of 4,500 qualified medical practitioners is to be sent into the countryside this year.

The people of the Soviet countryside have developed enormously. Many of them, like the air aces Vodopyanov, Paulina Ossipenko and Molokov, the Academician Lysenko, and Lemeshev, the famous opera singer, are the pride of the Soviet people. Their names are household words.

Many men and women collective farmers have been decorated for their services and elected to the supreme parliamentary bodies of the U.S.S.R. and constituent republics and participate in the government of the country.

The Revolution emancipated the women, gave them equal rights with men. Their last fetters were snapped by the collective farm system. The women collective farmers earn work-day-units in their own right and are dependent upon no man for their keep. Tens of thousands of women collective farmers are working as brigade leaders, as chairmen of collective farms and village Soviets. No less than 50,000 women are working as tractor drivers and harvester-combine operators. It was a woman, Maria Demchenko, who took the lead in developing the Stakhanov movement in the countryside, which has now enlisted immense numbers of men and women collective farmers.

Every year brings increasing harvests, increasing productivity in the livestock departments and increasing prosperity for the collective farms. The collective farmers are living a well-to-do and cultured life. And with the advance of culture in the villages, the difference between town and countryside is slowly but surely passing away.

SCIENCE AT THE SERVICE OF SOVIET AGRICULTURE

BY

By N. Tsitsin

ORDER OF LENIN. MEMBER OF THE ACADEMY OF SCIENCES

MEMBER OF THE SUPREME SOVIET OF THE U.S.S.R.

TWO conceptions more remotely related than peasant farming and agricultural science could hardly have been found in old Russia.

The peasants jogged along as best they could without the aid of science or any prospect of receiving it.

Only after the establishment of Soviet government did agriculture develop into a concerted effort for high crop yields, with the state directing and supporting it as a prime duty.

In a comparatively short time all conditions have been created in the Soviet Union for the unrestricted development of agricultural research on a scientific basis.

There are now over 14,000 scientists at work in agricultural research.

In the Soviet Union there are 90 agricultural research institutes, 367 experimental stations, and 507 experimental farms with numerous branches, whereas in tsarist Russia institutions of this kind could have been counted on one's fingers. But that is not all. Bearing notable witness to the tremendous interest of the Soviet peasantry in scientific agriculture, there are about 20,000 small but efficient laboratories functioning on the collective farms (*kolkhozes*). It is not difficult to imagine on what fertile soil falls every scientific discovery and innovation.

In 1938 seventy per cent of the area under grain in the collec-

tive farms and state farms was sown with high-grade seeds.

The state has organized 1,547 experimental farms for the testing of cereal seeds in all parts of the country. Furthermore 693 agrochemical laboratories have been organized by the machine and tractor stations.

In the U.S.S.R. no scientific discoveries are left to grow cob-webs. They are immediately put to exhaustive tests and practical use. It is easy to imagine what a great incentive to scientists is thus provided.

For instance: in the spring of 1936, the All-Union Institute of Seed Selection and Genetics sent a newly-evolved variety of spring wheat ("Lutescence 1163") to a large number of collective farms for propagation. The members of the "Fifty-First Perekop Division" Kolkhoz (Odessa region) received 6½ lbs. of seeds for their laboratory. They proceeded with enthusiasm to their propagation. This half peck of seed produced a yield of 13½ cwt. in the first year. In 1937 the kolkhoz collected a harvest of 167 cwt. from the new variety of spring wheat. And a year later "Lutescence 1163," which has proved to be the highest yielding grain in the southern districts, held dominion over 2,470 acres in this farm.

Rapid developments are being made in the theory of controlling vegetable life to reform inherited characteristics for the benefit of agriculture.

The late I. V. Michurin, a member of the Academy of Sciences, working in the same field as Luther Burbank, proved that under suitable conditions young hybrid seedlings can be trained to develop any desired characteristics.

Michurin took hardy wild plants from Siberia, Canada and various mountain regions and crossed them with delicate southern plants. The cross-breeds so obtained inherited all the hardihood of the wild flora: resistance to frost and drought and immunity to disease. On the other hand, they resembled their delicate parents of the south in tastiness, brightness of colour, largeness of fruit,

and other desirable characteristics.

In this way Michurin bred a large number of remarkable varieties of fruit, among which we might mention the Belfleur Kitaika apple, the Krasa Severa cherry and the Michurin Beurré.

As a result of a number of interesting and original experiments he also succeeded in hybridizing the cherry and bird cherry, the peach and the almond, the apricot and the plum, and many other fruits.

Altogether Michurin evolved 300 valuable varieties of fruit.

Michurin's work has found many followers. Michurin orchards and Michurin clubs have sprung up in all parts of the country.

Year by year grapes and peaches, pears and lemons continue their triumphal advance to the north, spreading ever to new territories. In the R.S.F.S.R. alone about 10,000,000 Michurin trees will be bearing fruit by 1940. The fruit gardens of the U.S.S.R., covering an area of 3,211,000 acres, produce more than twice as much as pre-war.

Apart from state-owned orchards there are large kolkhoz orchards supplying the market. The district of Genichesk, Zaporozhye Region, where in 1917 there were neither orchards nor vineyards, now has 1,069 acres of orchards and about 1,000 acres of vineyards.

Michurin's labours have introduced important new factors in the development of citrus plants and other sub-tropical crops. Now in the coastal regions of the West Caucasus new plantations of oranges, lemons, tangerines and tea are being developed year by year. Sunny Georgia is becoming the supplier of citrus fruits for the whole country.

In 1938 over 250,000,000 of the oranges and lemons placed on the market were grown on state farms and collective farms. By 1940 the Georgian republic will have 50,000 acres under citrus fruits.

Trofim Lysenko, member of the Academy of Sciences, is an-

other outstanding scientist whose work has greatly assisted the development of Soviet agriculture. He is the author of the theory that the development of annual plants proceeds by stages. The first and second of the stages he found to consist in reaction to temperature and light respectively, and upon these he concentrated.

From these studies Lysenko evolved a new process in scientific farming: vernalization, that is, subjecting the seeds to indoor temperature before planting. The experience of tens of thousands of farms has shown that as a result of vernalization the seeds sprout two or three days earlier, while the yield increases by an average of 90—180 lbs. per acre.

The vernalization of grain crops is practised on a wide scale in the U.S.S.R. In 1938 the area under vernalized grain reached 24,700,000 acres, and this year's plan (1939) is 35,748,000 acres.

The vernalization of sugar beet, potatoes, cotton and other crops is also widely practised in the U.S.S.R.

Lysenko has also devised new methods of selection. Using these methods he has produced in the space of two and a half years excellent varieties of spring wheat in the Odessa region. With his colleagues, Lysenko has devised a method of improving the seeds of self-fertilizing plants by interbreeding and nursing them on seed plots.

The farms using these improved seeds gain an extra yield of 134 to 178 pounds per acre.

The writer himself is working on cross-breeding cultivated plants with extraneous wild grasses. We have made many successful experiments in crossing wheat with couch grass, and have discovered the varieties of this very common weed that cross with wheat. In 1930 I produced the first hybrids of wheat and couch grass. This led to the novel hypothesis that a new variety of plant, non-existent in nature, might be obtained—perennial wheat. In 1934 the first families of perennial hybrid wheat, Nos. 34085

and 23086, were selected. They proved my theory.

These perennial wheats have the unusual power of growing again after reaping. It has been demonstrated under experimental conditions, with three years' continuous vegetation, that these hybrids yield seven or eight harvests from a single sowing.

At the present time perennial wheat is being tested by our farmers. Even under the unfavourable climatic conditions of 1938 in the Moscow Region perennial wheat yielded as much as 19 cwts. per acre. Perennial wheat also has exceptional drought-resisting properties.

In addition to these perennials, annual forms of the same hybrid have been evolved with numerous valuable properties and characteristics of their own.

At an experimental station in Voroshilovsk (North Caucasus) the agronomist Derzhavin is working on important experiments towards hybridizing a variety of hard wheat with perennial rye. He too has evolved a triennial wheat.

My theory that every agricultural plant can be matched with a wild one has become a principle guiding many research workers.

The results of these studies in wheat breeding, so wide and diversified, have already been put to practical use in Soviet agriculture.

Wheat, like Michurin fruits, is being grown further and further north and spreading over wider areas every year.

In the old days the central regions of Russia proper grew nothing but rye. Wheat bread was a rare delicacy on the table of the Russian peasant, and was regarded as a sign of prosperity.

At the present time wheat is being sown in a large number of new regions. Even where the climate is severe for wheat, there are no peasants who go without white bread.

The conquest of the Arctic, the discovery of new deposits of coal, apatite, iron and other economic minerals in the far north of the country have led to the population of uninhabited districts

and created a demand for local farm produce.

In this direction useful work is being done by the Arctic experimental station of the All-Union Institute of Plant Growing, directed by Academician Eichfeld. This polar station has evolved new kinds of barley, oats, vegetables, fodder grasses, potatoes and other edible roots suitable for cultivation in the far north.

In the Republic of Yakutia, with its perpetually frozen soil and brief dry summer, the kolkhoz farms, by employing advanced agrotechnical methods and cultivating the soil with tractors, are getting good harvests regularly. For instance, the Orjonikidze Kolkhoz, in a district where the annual mean is 9°C., grows 22 tons of cabbage to the acre.

Before the October Revolution there was no hothouse farming in the Far North. Now there are 73,000 hotbeds and 451,920 sq. feet of greenhouses. On the shore of the Kola Strait, near Latitude 70° N., the collective fisheries "Tarmo" and "Taisto" obtain over 8 tons of potatoes and sixteen tons of other edible roots to the acre. In 1938 the "Industria" State Farms in the Murmansk region harvested 12,792 cwt. of vegetables, about 28,000 cwt. of potatoes, thousands of centners of edible roots and tens of thousands of centners of hay. Apart from sowing in the open field this state farm also has a large area under glass, which in 1938 yielded 436 tons of vegetables.

The growing of greens in the open air has now become practicable right up to the shores of the Kara Sea and the Siberian coast of the Arctic ocean.

Soviet agricultural science has been highly successful in naturalizing crops in new localities. The Kuban is now growing rice, while the North Caucasus and the Ukraine are growing cotton.

New sugar beet districts have been developed on the Kuban, in the Saratov region, the Altai territory, and other parts of the country. By 1937 the area under cotton in the U.S.S.R. had reached

701,480 acres, and in the Ukrainian S.S.R. 553,280 acres.

The great emigration of crops to the north of the country was undreamed of by agronomists in the old days. It has become possible, due largely to the fruitful labours of Soviet scientists in genetics, selection and seed farming. The U.S.S.R. has the most northern cotton plantations in the world, extending to 48° N.

In Azerbaijan (Caucasus) and Turkmenia (Central Asia) new varieties of Egyptian cotton have been produced and are already being cultivated in the collective farms and state farms. These varieties are extremely fertile and ripen early.

In 1930 the plantations of Egyptian cotton in the U.S.S.R. covered a total area of only 11,830 acres. In 1938 Egyptian cotton was being grown over an area of 339,748 acres.

Highly fertile varieties of American cotton, with a long fibre, have been evolved by selection and are becoming widespread.

The Odessa Institute of Selection and Genetics (directed by Academician Lysenko) has bred two new fertile and early-ripe varieties of cotton (OD-1, OD-2) growing a long fibre. This year 50,000 acres of land will be planted with these varieties.

A number of successful experiments have produced several new varieties of sugar beet with a high sugar content and other valuable properties.

Soviet selection experts have also evolved highly fertile varieties of potato. For the first time in the history of the science of selection, the Potato Institute has produced a variety (No. 8670) that resists parasites (Phytophthora). With the help of the collective farms this institute in four years obtained 11,500 tons of potato from 20 beds planted with "8670."

Lysenko has also elaborated a method of planting potatoes in summer, which has revolutionized the development of this culture in the steppes of the U.S.S.R. Formerly planting stock in the south had to be completely renewed every two or three years with seed potatoes from districts further north. This was regarded as

the only method of preventing potatoes from running to seed in southern districts, like the Crimea, where the crop scarcely recompensed the farmer for what he had sown. Summer planting put an end to this. The collective farms and state farms in the south now obtain good crops regularly every year. For instance, the "Chervonny Kazak" Kolkhoz in the Jankoi District of the Crimea increased the yield to ten and a half tons per acre by using Lysenko's method.

Great progress has been made by Soviet scientists in the protection of plants against pests and blights.

Especially wide use is made of oöphagous trichogramminae to combat destructive moths and grubs. Hundreds of special laboratories for the breeding of trichogramminae have already been organized on kolkhoz farms.

One of these laboratories, directed by collective farmers Moskalenko of the "Shlyakh Lenina" Kolkhoz, Yampol District, Vinitsa Region, Ukraine, bred 37,000,000 of these insects, which afterwards rid an area of 914 acres of destructive moths.

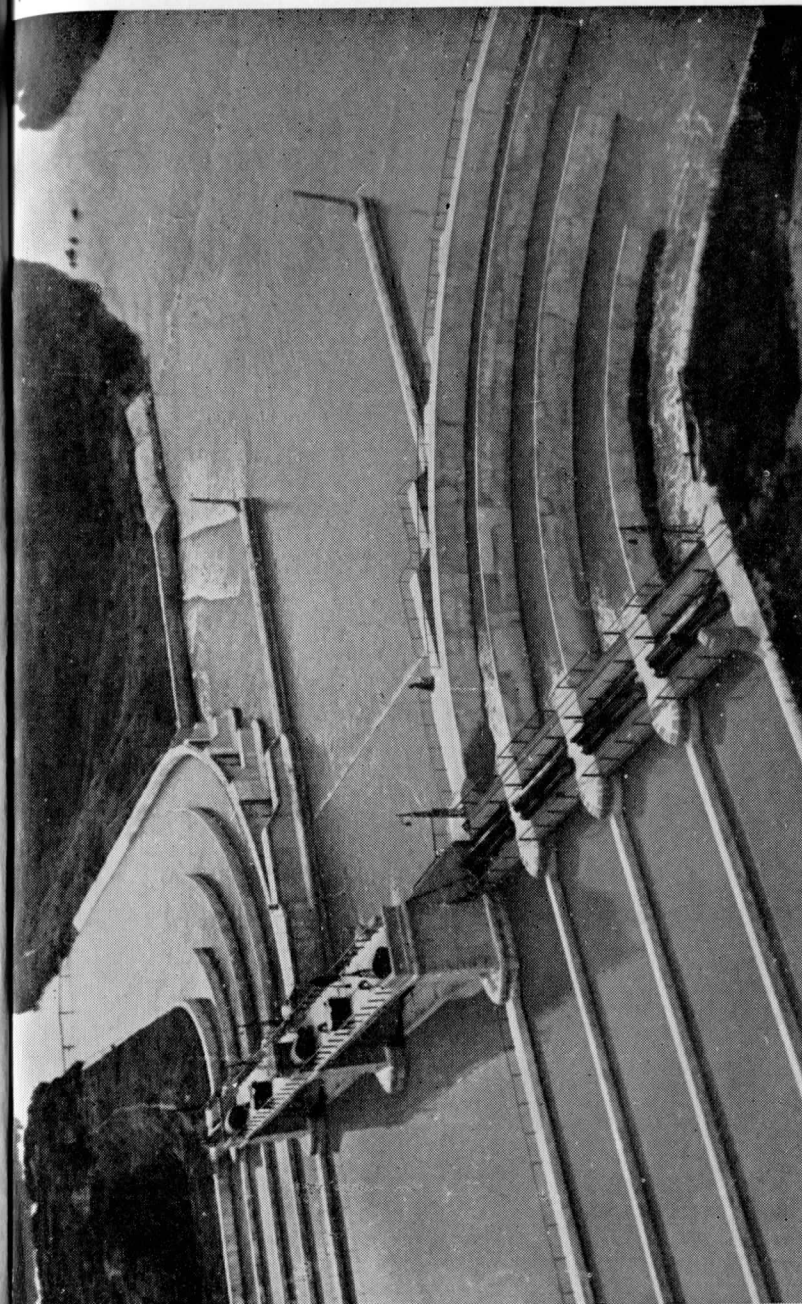
Soviet research laboratories have discovered a number of viruses for use in combating various agricultural pests and diseases.

Great progress has also been made in the field of agrochemistry. Academician Pryanishnikov has discovered the principle of using ammonia salts as fertilizer.

In recent years leading collective farmers, state farm employees and managers of kolkhoz laboratories have been experimenting with the "dieting" method, that is, dosing crops with fertilizer at various stages during the vegetation period. At the present time this method is being used on huge areas, particularly those under industrial crops.

In tsarist Russia the outlay of potassium fertilizer was something less than a teaspoonful to the acre.

In the U.S.S.R. mineral and natural fertilizers are used in vast quantities. In 1937 ninety per cent of the beet fields and cotton



KIRGHIZID
Irrigation Works

plantations were enriched with mineral fertilizer. At the same time there is a constant increase in the general distribution of manure.

In 1937 the chemical industries of the U.S.S.R. supplied the countryside with 2,798,000 tons of mineral fertilizer, as against 230,000 tons in 1913.

Among the great achievements of Soviet agricultural science we must also count the introduction of bacterial fertilizer—nitragin—for various bean cultures, and the invention of a bacterial fertilizer—"Azotogen"—for cereals, industrial crops and vegetables. Experiments have shown that this fertilizer increases harvests by as much as 20 and 30 per cent.

The Tractor Institute and a number of tractor plants have designed and built tractors powered with Diesel engines and gas producers, which, as tests have shown, run at a low cost and give long service without repairs.

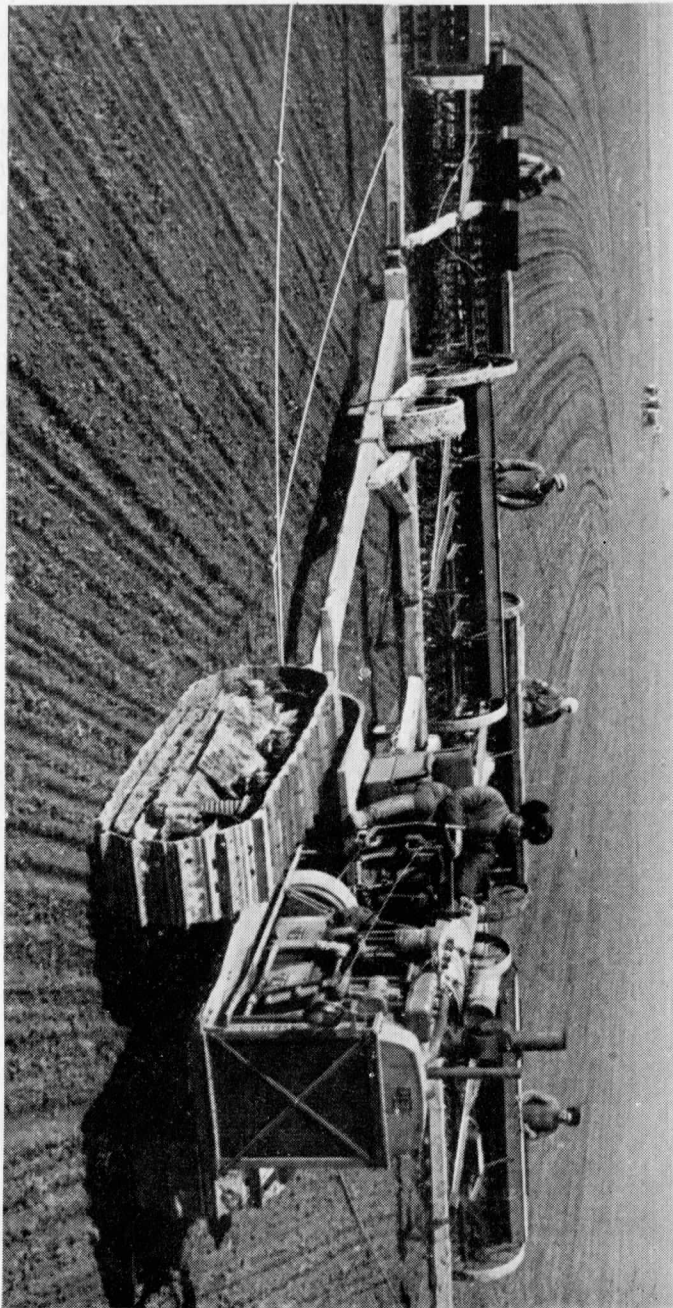
The Institute of Scientific Sowing has designed machines for sowing in close drills. When sown in the usual way plants often grow in adverse conditions, are ill-nourished, stifled by their neighbours and stunted in development. The new seeders will make it possible to distribute the plants more rationally, so as to guarantee, as far as possible, a place in the sun for all. New types of seeders have been invented for grain crops, sugar beet and other industrial crops. In 1939, 2,717,000 acres were sown with these close seed drills.

Under the First Five-Year Plan much was done in theory and practice to improve grain harvester combines. Special attachments were devised for collecting sunflowers, castor oil plants, millet and other crops.

Soviet inventors have devised a special harvester combine for collecting grain crops in the humid conditions of the northern districts. Hundreds of these special "northern" combines were employed during the harvest last autumn. Soviet engineers have

c2

A TRACTOR DRIVER



also designed machines for the planting, cultivating and picking of potatoes, sugar beet, flax, cotton, and other crops laborious to farm.

No less progress has been made by Soviet scientists in the field of livestock breeding. Unfortunately, lack of space does not allow me to dwell in detail on this department of farming. I might mention the work of Academician Ivanov, who is breeding valuable hybrids, notably the Askana Rambouillet and a new breed of pig—the Ukrainian White.

The All-Union Institute of Animal Breeding has developed a method and technique of inseminating animals artificially, so as to make the maximum use of valuable males.

In 1938, 1,536 cows were inseminated from one bull and produced 1,490 calves; 15,016 sheep were inseminated from one ram and produced 15,662 lambs. By 1938 fifty million farm animals had been inseminated artificially in the Soviet Union.

Whatever branch of agriculture we take we find thousands upon thousands of collective farm experimenters working shoulder to shoulder with scientists in search of new methods, new discoveries.

This movement of innovators, boldly and rationally transforming nature, is becoming a real mass movement, a movement of the people. This is seen from the fact that at the All-Union Agricultural Exhibition of 1939, which will exhibit only the best of the best, 160,000 to 200,000 collective farms, state farms, machine and tractor stations, collective farm brigades and teams will be represented—real enthusiasts and front-liners of Socialist agriculture.

This close contact between Soviet science and the people allows our men of science to go boldly ahead with their experiments, enriching the collective farms and state farms with a wealth of modern scientific discovery.

Much has been and is being contributed to science by the practical experience of the collective farmers. Soviet academicians

and professors, all our leading scientists, make these contributions the basis of their work in the service of Soviet science and the Socialist farms of the U.S.S.R.—the country of large-scale agriculture unmatched in the world.

Ivan Michurin often said: "We can expect no favours from Nature; our job is to take them."

In the U.S.S.R. thousands of people are taking part in this great duel with Nature, in a true spirit of innovation, enthusiasm, pertinacity and research. That is why the reorganization and renewal of the countryside in the Soviet Union has, in the space of twenty-one years, produced such astonishing results.

THE COLLECTIVE FARMS (KOLKHOZ)

By F. Klimenko

ORDER OF LENIN. CHAIRMAN OF THE STALIN COLLECTIVE FARM,

GENICHESK DISTRICT, UKRAINE

MEMBER OF THE SUPREME SOVIET OF THE U.S.S.R.

IN tsarist Russia the 28,000 landlords owned 167,000,000 acres of land and the 10,000,000 peasant households 197,000,000 acres, of which the most fertile sections were owned mainly by the kulaks. Huge tracts of the best land were the property of the royal family and of the monasteries. The landlords and kulaks, who constituted somewhat over 13 per cent of the population, controlled 71.6 per cent of all the grain marketed.

The old villages were poverty-stricken and squalid: 65 per cent of the peasant households were made up of poor peasants; 30 per cent had no horses and 34 per cent no agricultural implements, being obliged to hire them from the kulaks if they wanted to cultivate their tiny allotments or the plots they managed to rent from the latter or from the landlords. Most of the harvest went to pay for these services, leaving a bare pittance for the peasant's family. Fifteen per cent of the peasants did not have the wherewithal to sow any crops whatever. For many peasants a piece of unadulterated bread made of pure grain was a rare feast, since most of the year they ate all sorts of substitutes.

Every year 2,000,000 poor peasants left their homes to work on the landed estates and kulak farms in the Kuban and the Ukraine.

Yuzkui, the village where I was born, can serve as a vivid illustration of the backward and impoverished condition of the

peasants before the Revolution and the brutal exploitation to which they were subjected.

There were 3,000 households in our village. The best lands belonged to the landlords Virkentin and Fischer, and were worked by hands hired in our village and the nearby villages and by landless peasants from other parts of the country who were driven by poverty and hunger from place to place in search of work and bread. The peasant allotments in our village were only about five or six acres, and never more than eight.

The land was worked in an extremely primitive way: a piece of land was sown, the crop harvested and then was left to lie fallow while another plot would be cultivated. Crop rotation and scientific farming had never even been heard of. No fertilizers were used on the land. Selected seed was quite out of the peasant's reach. Only very few among the peasants owned metal ploughshares or reapers. Most of the Yuzkui peasants used antiquated wooden ploughs and flails. Nor did every peasant have a horse. Those few who could boast of one, for the most part possessed only some sorry old nag. It is small wonder then that the grain yield on the peasants' land was generally from 0.15 to 0.2 tons per acre, and decreased with every year.

Land hunger drove the peasants into kulak bondage. Here is the story of Ivan Ponomarenko, a former farmhand, now a collective farmer: "My father was a cowherd for twenty years on the estate of a big landlord named Fischer. We were a big family, thirteen of us, all huddled together in a little mud hut. We never had a horse or a cow; our livestock consisted of half a dozen hens. On the 1.3 acres of land we had, we planted potatoes. During the war I worked on the estate of Grand Duke Michael, the brother of Tsar Nicholas. I earned around forty rubles a year. Cabbage water soup and millet was what I fared on. It was only on big holidays that I tasted meat."

This is how the poor peasants lived in tsarist Russia; nor were

the middle peasants much better off.

In November 1917 the workers and peasants drove out the landlords and capitalists, put an end to private property in land and turned over the big estates and the monasterial lands to the working people. The countryside began to emerge from its age-old ignorance and to refashion its life along new lines.

The Communist Party and the Soviet Government showed the peasants that the only way they could put an end to kulak exploitation and, with it, to poverty, was by passing from petty individual farming to large-scale socialized farming. The Soviet peasantry adopted this way and began to set up artels—associations for the joint cultivation of the land—and in some cases an even higher form of collective farming—agricultural communes.

In 1921, our village of Yuzkui organized a commune which we called "Equality Commune." It was started by a number of Red Army men who had returned to the village after the Civil War—Nikifor Sologub, Ivan Chaplyga, Yegor Simonenko, Pavel Chernenko, Afanasy Pivovarov and my father, Nikita Klimentenko, all former peasants of Yuzkui. Originally the Commune included eleven families. They received land that had formerly belonged to one of the landlords' estates, pooled their horses, cows and agricultural implements, and, disregarding the kulaks' venomous threats and dire prophecies, set to work.

At first things were quite difficult. The Commune had no seed, only five horses, and nothing but a seeder and a buckler as regards equipment. But the government gave us a helping hand, and the Commune began to grow and become strong. By 1927 it was already cultivating 925 acres of land and had 17 horses, 4 pairs of oxen, 42 cows, a large number of hogs, sheep and poultry.

Starting with 1918, peasants began to abandon their individual methods of farming and to adopt collective cultivation of the land. In addition to the communes, artels, or agricultural cooperatives, began to appear. The poor peasants were the initiators of these

associations and their leading members. The middle peasants waited to see how things would turn out, undecided. However, when they saw with their own eyes the advantages and profit resulting from working in common, they too began to enter the collective farms (*kolkhozes*).

The state supplied the kolkhozes with seed, machinery and other agricultural equipment, and accorded them various privileges. With every year the number of collective farms increased. In 1918 there were 1,600; in 1923, 12,609; in 1927, 18,840; and by 1928 33,258.

The influx of poor and middle peasants began on a large scale in 1929. By that time the Soviet Union, having restored its economic life after the devastation of the imperialist war and the Civil War, was developing industry at a rapid pace. The countryside was supplied with thousands of first-class agricultural machines. The collective farms expanded and took firm root. In 1930 their number increased to 85,900, and by 1934 it had reached 233,300.

At the end of 1929 the various small kolkhozes and communes in our village, including our Equality Commune, merged to form the big new Stalin Commune. Our crops increased every year; we acquired new machinery and equipment; our income grew steadily.

It was not entirely smooth sailing, however. Not every member of the Commune came to work on time, nor did everyone work equally well. Yet all the members shared the benefits of the Commune equally.

At the Congress of Kolkhoz Shock Workers our chairman, Pivovarov, had a talk with Stalin. Stalin asked him many questions about our Commune. He wanted to know whether the members had cows, pigs and poultry for their personal use, and what difficulties they encountered. When he had heard all the details, he advised us to adopt the Rules of the Agricultural Artel and to supply every household with a cow, poultry, and so on.

We followed his advice and reorganized our Commune into a kolkhoz along the lines of the new Rules of the Agricultural Artel. The kolkhoz members were provided with cows, pigs and poultry for their personal use. We instituted rigid control of each member's output and divided our income in accordance with the number of work-day units each member of the kolkhoz had to his credit.

What is a work-day unit?

It is the equivalent of the average amount of work that can be performed by a collective farmer in one working day, as fixed by the standard quota set for each type of work. These quotas are fixed for each collective farm in accordance with the condition of the machinery, the draft animals, the soil, the difficulty of the work, the degree of skill required, and so on. For the performance of the specified day's quota of work the collective farmer is credited with one work-day unit.

If in the course of the day a kolkhoz member performs more than the specified quota, he is credited correspondingly with more than one work-day unit. Thus his share in the collective farm income depends on the quantity and quality of work performed. The work-day units are calculated and recorded by the head of the brigade in which the collective farmer works and by the quality inspector, after the work has been inspected.

This distribution of income according to the work performed helped to improve discipline and increase labour productivity. The farm began to develop even more rapidly.

The collective farm Rules definitely specify that on entering a kolkhoz the peasant must hand over to it the land he has been using, and also his draft animals and agricultural equipment. Cows, domestic animals and poultry are not subject to socialization, nor is the peasants' personal property. The public buildings of the collective farm—stables and sheds for its livestock and poultry, granaries, clubs, etc.—are in the collective use of the farm. In

addition, every kolkhoz household is allotted a plot of land for personal use, where a vegetable garden or orchard can be cultivated for the personal use of the household.

To assist the collective farms, the Soviet Government has established machine and tractor stations all over the country. At present there are 6,350 such stations in the Soviet Union. At the end of 1938, 483,500 tractors, 153,500 harvester-combines, 195,800 lorries, hundreds of thousands of tractor-drawn ploughs, seeders, cultivators, complex threshers and various other up-to-date agricultural machines were employed in the Soviet fields.

The attention accorded the peasants by the Soviet Government, its constant concern for their welfare made possible the successful introduction of universal collectivization and the transformation of the U.S.S.R. from a country of small-scale, backward agriculture into a land of mechanized agriculture on the largest scale in the world.

In the U.S.S.R. today there are 243,300 kolkhozes, which unite 18,800,000 peasants households, or 93.5 per cent of all peasant households in the country.

Our collective farm numbers 674 families, 518 of which were formerly families of poor peasants. Nearly 30,000 acres of land have been reserved to us. The farm includes 1,480 acres of hay-field, 8,980 acres of pasture, 104 acres of woods which serve to protect the fields from winds, and 1,081 acres of vegetable gardens and orchards. Besides this, several hundred acres of land constitute the plots in the collective farmers' personal use.

The kolkhoz management board is elected at a general meeting of the membership. Important matters, such as the distribution of income, capital construction and large purchases, are decided on only by the general meeting.

In most of the collective farms the members are divided into brigades. We have twelve production brigades, whose heads are elected by the general meeting. We also have an agronomist,

several breeding experts, and a veterinary surgeon.

We have 13,830 acres under field crops, 60 per cent of which are grain. Industrial crops are raised on 1,270 acres, cotton occupying 1,185 acres. The rest of our land is sown to fodder, vegetables and gourds.

Our collective farm is located in the South of the Ukraine, by the Sea of Azov. This region is rather arid, but we are learning to master nature, and our farm has large harvests of all crops every year. Despite the exceptional aridity of the summer of 1938, our average grain yield was 1,456 lbs per acre, and the yield of non-irrigated cotton, the cultivation of which we first introduced five years ago, amounted to 715 lbs. per acre.

Scientific methods of farming and mechanization are helping us to combat drought. We are extending the area of autumn and early spring fallow for grain crops, ploughing the fallow in good time, and weeding it by tractor as often as six times. We plough by tractor to a considerable depth—8-9.5 inches, and use large quantities of potassium, phosphate and nitrate fertilizer in addition to manure. We sow only high-grade selected seed. For our spring crops—cotton, oats, barley and the rest—we always plough the land to a good depth in the autumn or early in the spring. We are boldly applying the latest discoveries of agronomy and the experience of the foremost Stakhanovites on our fields. Thus, for instance, vernalization methods recently evolved by Academician Lysenko have enabled us to increase the yield of cereals and cotton by 135-180 lbs. per acre.

Mechanization is a most important factor in increasing the yield in our collective farm. The entire spring and autumn ploughing is done exclusively by tractors. In 1938, 97.7 per cent of the area under grain was harvested by combines. All the land left fallow for the 1939 crop was tractor ploughed, as was 77 per cent of the land ploughed in the autumn. Weeding, harrowing, clearing the field of stubble, and other processes have also been mechanized.

The number of our livestock is increasing as well. Our collective farm now owns 800 head of cattle, 460 horses, 7,000 sheep and 360 pigs, exclusive of the animals that are the personal property of the collective farmers themselves. The livestock is kept in light, warm and airy buildings, which have running water and are always clean and orderly.

Big progress in stock-raising has been made throughout the country. In 1938 alone, the number of horses in the kolkhozes increased by 8 per cent, the number of colts by 9 per cent, of sheep and goats by 19 per cent and cattle and pigs by 6 per cent.

The increasing yields and growing productivity in stock-raising are accompanied by an increase in the wealth of the collective farms and in the material well-being of the collective farmers themselves.

Whereas in 1930 the gross income of our kolkhoz was 424,000 rubles, by 1938 it had reached 3,300,000 rubles.

The greater part of the income is distributed among the members in accordance with the number of work-day units credited to them; 4.3 per cent goes for government payments, 0.8 per cent for managerial expenses. We also spend large sums for developing the farm and providing conveniences for our members. When the Commune was first organized, we did not have a single decent building, not a single machine of any kind. Now our streets are lined with well-built houses. We have 8 power engines and 9 lorries. Every brigade has its silo. The animals are housed in newly-built modern sheds and stables. Our buildings, tools and machinery total a value of nearly 2,000,000 rubles.

In 1933 every collective farm household in the grain regions received on an average one clear ton of grain for the year. By 1937 this amount had risen to 2.36 tons. The total cash income of the collective farms of the U.S.S.R. has increased during the same period from 5,661,900,000 rubles to 14,180,100,000 rubles.

In 1938 our kolkhoz distributed 1,960,000 rubles in money as the

share due for work-day units. The income in kind is also divided in accordance with the number of work-day units after grain deliveries to the state have been made, payment has been rendered the machine and tractor stations for their services, seed has been set aside for the next sowing and fodder has been provided for the collective farm cattle. In 1938, our kolkhoz members received 11 lbs. of grain and 5 rubles 10 kopeks in cash for every work-day unit. Take collective farmer Borodin's family. This family received 6.7 tons of grain and 6,932 rubles in cash as their share of the collective farm income. Collective farmer Ponomarenko's family received 6.2 tons of grain and 6,326 rubles in cash. K. Pakhomenko, a Stakhanovite, received 5 tons of grain and 5,120 rubles in cash. Most of our collective farm members received similar incomes.

A life of prosperity brings culture with it. The tsarist government did its best to foster chauvinism and dissension; it incited the Russians against the Ukrainians, the Ukrainians against the Jews, the Georgians against the Armenians, and so on. In the U.S.S.R., with its Socialist culture, a great and inviolable friendship and amity exists between the various peoples and nationalities.

Russians and Ukrainians, Jews, Gypsies and Poles live and work in complete harmony in our collective farm.

Khalil Saitov is a Gypsy. He spent most of his life wandering over the steppes. His children were born in a cold, wind-beaten covered wagon. Now his family is happy and prosperous.

Mikhail Piznoy is a Jew. He is in charge of one of our brigades and commands the respect and affection of all our members. His brigade has secured the high yield of 0.9 tons of grain per acre.

Boody, a Moldavian, was for many years a shepherd in the sun-scorched steppes; he worked for next to nothing for the kulaks. Now he is a well-to-do collective farmer, and is in charge of a section on our farm.

Some twenty-five years ago, before the Revolution, it was no

easy matter to get permission to open a school in the countryside, and most of the children went without any schooling. Now we have plenty of schools. The kolkhoz also has a moving picture theatre for showing sound films, several clubhouses, a good library, a radio broadcasting station for local purposes and a power plant. This year the members subscribed to 24,000 rubles' worth of books and periodicals. We have a maternity home, a nursery, a good public bath and a barber's shop.

The collective farmers' homes are lighted by electricity and comfortably furnished. Nearly 3,000 of our members have bicycles. The young people go in for sports (300 of our members have received the Voroshilov Badge for marksmanship), and are enthusiastic members of the club dramatic, singing and music circles. There are no illiterates in our farm. Eighty per cent of our members have had an elementary or secondary education, and 20 of the members have had a university education. Over 500 children attend the ten-year secondary school. Twelve of our young people have graduated in agricultural or industrial training schools.

Hundreds of people who formerly went unnoticed have developed into capable executives in government and public bodies. A. Pivovarov, formerly chairman of our kolkhoz, is now chairman of the executive committee of the District Soviet and has been awarded the Order of Lenin by the Government. N. Pikulsky is manager of the repair shop at our Stalin Machine and Tractor Station. P. Letugin took a post-graduate course at the Institute of Agricultural Economics and now occupies an important post in the People's Commissariat of Agriculture of the U.S.S.R. P. Ponomarenko is in charge of one of the biggest state farms in the Zaporozhye Region. I. Ivanov, a former member of our kolkhoz, is the chairman of a district executive committee in the same region. The names of Feshchenko and Valovaya, brigade leaders outstanding for the big harvests they secured, are known far beyond the bounds of our region. Grigory Koshka, one of our shep-

herds, is an outstanding Stakhanovite, who gets letters from collective farms all over the U.S.S.R. He has achieved a record increase, over 140 lambs for every 100 ewes—in the size of his flock.

The collective farm system has opened broad prospects for the peasant woman both in production and in public life. It is helping to efface the distinction between town and country. Remoulding economic life in the villages, it is radically refashioning the people as well.

In February 1939 our collective farm was awarded the Order of Lenin by the Government for its outstanding achievements.



COMBINE HARVESTERS
On the Gigart Collective Farm

THE STATE FARMS

By P. Lobanov

PEOPLE'S COMMISSAR OF STATE FARMS OF THE U.S.S.R.
MEMBER OF THE SUPREME SOVIET OF THE R.S.F.S.R

OLD Russia was primarily a country of small-scale peasant agriculture. The great mass of the peasants held tiny plots of land while hundreds of millions of acres of the best land belonged to the royal family, the church, the nobility, and the kulaks, who exploited the poverty of the peasants to cultivate their estates. The only agricultural implements available to the peasants were primitive wooden ploughs and harrows that did little more than scratch the soil. Peasant farming before the Revolution was a constant struggle for meagre harvests, under the threat of drought and famine.

Agriculture in the Soviet Union presents a totally different picture. The peasants have pooled their resources in large-scale collective farms, the kolkhozes. Moreover, 6,350 machine and tractor stations have been opened—state enterprises through which the Soviet Government renders the collective farmers scientific and technical assistance. In 1938 there were 483,500 tractors at work in the fields of the Soviet Union, 153,500 harvester combines and hundreds of thousands of other complex agricultural machines. In addition to the collective farms, which are co-operative bodies of peasants working and owning the implements in common, there are large-scale state agricultural enterprises, state farms which are run on industrial lines.

The first farms were organized by the Soviet Government in

D2

A COLLECTIVE FARM IN
BURYAT-MONGOLIA



1918, but their rapid development began in 1928-29 when, on the initiative of Stalin, large state grain farms using modern methods were organized all over the country. By the spring of 1930, 143 state grain farms had been organized. After them came large-scale stock-raising farms.

There are state farms in all parts of the vast Soviet Union: in the steppes of North Caucasus, the Crimea, the steppes of Orenburg, the Trans-Volga districts, and the spreading plains of Kazakhstan and Siberia.

The history of the state farms is one of the chapters in the great campaign for the re-organization of agriculture, the development of large-scale Socialist farms. As a result of this struggle the Soviet Government broke the resistance of the enemies of the Soviet people, who tried to frustrate the development of state farms by sabotage. Hundreds of large state grain farms and stock-raising farms are now thriving in all parts of the Soviet Union and have become an abundant source of grain, meat, milk and other supplies.

Already in 1930 the state grain farms supplied the country with 553,650 tons of grain. In 1933-37 the state grain farms and stock-raising farms, controlled by the People's Commissariat of State Farms, supplied the country with 9,136,600 tons of grain, 1,120,400 tons of meat, 4,095,000 tons of milk, and 65,500 tons of wool.

In order to put an end to kulak exploitation and save the peasants from hunger and poverty it was necessary to show them in practice all the benefits and the advantages of large-scale, mechanized Socialist agriculture. The state farms, equipped with up-to-date machinery and rationalized with the latest methods of agronomy and scientific animal husbandry, showed the peasants the advantages of large-scale Socialist agriculture. Thereby they played a great part in collectivization, the reorganization of peasant farming on modern lines.

By January 1, 1939, the number of state-farms in the U.S.S.R.

had reached 3,957. They now occupy an immense area of 168,000,000 acres. The majority of the state farms have been organized on land where tsarist Russia, with its backward agriculture, could make nothing grow. In other words, tens of millions of acres of land, previously uncultivated, have been brought under the plough. There are state farms in all the republics and regions of the U.S.S.R., even in localities where the population had previously been non-agricultural.

Besides producing foodstuffs for the urban industrial centres—grain, meat, milk, butter, fruit and vegetables—the state farms supply raw materials for our industries—cotton, flax, wool, sugar beet, vegetable and essential oils, etc.

There are also special state farms for breeding reindeer and various animals valuable for their fur, such as sables, martens, raccoons, and silver foxes.

The existing state farms are classified as follows:

Grain-growing	...	...	...	...	477	farms
Cattle-breeding	...	...	...	...	771	"
Pig-breeding	...	...	...	...	629	"
Sheep-raising	...	...	...	...	200	"
Growing cotton and other fibre crops	...	...	...	...	54	"
Growing special crops (tea, tobacco, etc.)	...	...	...	...	114	"
Fruit, vegetable and vine-growing	...	...	...	...	645	"
Studs	...	...	...	...	118	"
Reindeer-breeding	...	...	...	...	31	"
Poultry-raising	...	...	...	...	102	"
Suburban (chiefly for vegetables, dairy produce, and miscellaneous)	...	...	...	...	816	"

The scope of state farming may be seen from the fact that the total sown area of the state farms in 1938 was 30,628,000 acres.

The total livestock of the state farms is 2,597,000 head of cattle, 1,830,000 head of hogs and 5,676,000 head of sheep.

Under the first two Five-Year Plans the state invested about 15,000,000,000 rubles in the development of state farms and their technical re-equipment.

The state farms are powerfully equipped with machinery. The number of tractors, harvester combines, motor trucks and various farm machines is growing from year to year. The quality of these machines is constantly improving: old types of machines are being replaced by modern and more powerful ones. A good proportion of the tractors now in use on the state farms are of the large caterpillar type, while Diesel tractors and gas generator tractors are being introduced on a wide scale, and, with them, the giant harvester combine.

In the last ten years the number of tractors in the state farms has increased $12\frac{1}{2}$ times, aggregating 1,751,800 horse power. In the state farms there are 26,000 harvester combines and 30,600 motor lorries.

In the state grain farms 94.5 per cent of all work is now being done by mechanical traction while the harvesting is done exclusively by combines.

The wide use of machines on the state farms and collective farms has introduced new occupations in the countryside—tractor driving, combine operating, mechanics, lorry driving, which were unknown in the old Russian countryside. In order to satisfy this demand for skilled labour a great network of technical schools has been organized. Many of the schools are located directly on the state farms. Between 1931 and 1937 the state farms under the People's Commissariat of State Farms alone trained 200,000 tractor drivers, 52,000 combine operators, 25,000 assistant combine operators, 6,000 mechanics, and 27,000 foremen for grain farms and stock farms. The State farms run various schools and study courses to train skilled personnel not only for themselves but for the kolkhoz farms too.

The state farms employ great numbers of agronomists, engineers,

animal breeding experts, and veterinary surgeons. These professions are taught in a large number of special agricultural institutes and colleges. Through the institutes and colleges under its jurisdiction, the People's Commissariat of State Farms has in the last five years trained 2,000 engineers, 2,600 agronomists, 7,500 animal breeding experts, 3,500 veterinary surgeons. Furthermore, large numbers of agricultural experts for the state farms have been trained in other institutes of education.

The leading workers in the state farms—the Stakhanovites—are making world records with their tractors, harvester combines and other machines.

The tractor driver Belenko, of the "Bataiski" State Farm (Rostov Region), decorated by the government for his distinguished services, ploughed 5,965 acres in one season, while the tractor driver Kostenko of the Kropotkin State Grain Farm (Krasnodar Territory) ploughed 6,538 acres.

The tractor drivers Kopytko and Kovtun of the "Gigant" State Farm in North Caucasus, sowed 642 acres a day with 6 seeders hitched to a tractor of the caterpillar type.

During the harvest season of 1938 Bankin, a combine operator of the Privolensk State Cattle Farm (Rostov Region), harvested 6,290 acres of grain with a tandem of two combines, while Galunchikov, a combine operator of the "Podovinnoye" State Farm (Chelyabinsk Region), harvested over 3,700 acres and threshed 3,500 tons of grain.

Productivity is increasing in the state stock-raising farms also.

In 1938, for instance, Ulyana Barkova of the state dairy farm "Karavayevo" (Yaroslavl Region), got 8.8 tons of milk per cow. Kuznetsova of the "Kurkino" State Dairy Farm (Vologda Region) has reared over 1,000 calves without losing a single one. Every year, Lavrishko, the grazier of the Proletarsky Sheep Farm, North Caucasus, has 150 new lambs for every hundred ewes.

Modern machinery efficiently used has greatly increased the

productivity of labour on the state farms and their output. In 1938 the state farms supplied the state with almost ten times more grain and meat and five times more dairy produce than in 1929. The Soviet Government is taking good care that the workers in the state farms should have proper working conditions and living conditions.

The earnings of the regular workers in the state farms have increased more than two and a half times since 1932. In 1932 the annual earnings of the regular workers averaged out at 910 rubles, in 1938 the average was 2,396 rubles (an increase of 163 per cent). This increase has been particularly great in the case of the workers employed on the pig breeding farms: from 777 rubles a year to 2,499 rubles—a more than three-fold increase. In the same period the workers in the state sheep farms increased their earnings by 169 per cent (from 847 to 2,278 rubles a year), the workers in the state dairy and meat farms—by 160 per cent (from 854 to 2,219 rubles a year) and the workers in the state grain farms by 128 per cent (from 1,201 to 2,742 rubles a year).

There has been a considerable increase in recent years in the wages of tractor drivers, combine operators, milkmaids, and other skilled workers. In August 1935 tractor drivers earned an average of 216 rubles a month during the harvest. In August 1938 the average was already 383 rubles (an increase of 77 per cent). In April 1935, milkmaids earned an average of 96 rubles a month. In 1938 they earned 174 rubles (an increase of 81 per cent).

The Stakhanovites are greatly increasing their earnings. For instance, the tractor driver Babich of the Krivoi Rog State Grain Farm in six months of 1938 earned 5,500 rubles. The milkmaids of the "Lesniye Polyany" State Dairy Farm (Moscow Region) Markina and Rindina earned from 800 to 1,000 rubles a month.

The state farms have an eight-hour day. Every worker has an annual vacation with pay. Many workers spend their vacations in Sanatoria and rest homes at the expense of the state.

Many state farms are real townships, populated by thousands of people. Every state farm maintains nurseries, maternity homes, hospitals, clinics and schools, all expenses being borne by the state.

There is little to distinguish life in the state farms from the life of the workers in the towns. In the "Electrozavod" State Grain Farm (Chkalov Region), for instance, the workers have a club, a moving picture theatre, a large library, 9 elementary and secondary schools, courses in agricultural training, a hospital with 35 beds, a clinic, a drug store, nurseries, etc.

One hundred and thirty comfortable and well-designed houses have been built for the workers. All the apartments have electricity and radio installations.

Who are the men who manage these great enterprises?

They are engineers and agronomists, most of them former workers, collective farmers, agricultural labourers who came to the state farms to perform simple, unskilled labour and acquired experience and a preliminary training which they later continued in special schools and colleges.

Here is the story of Denis Pavlovich Drieg, the assistant director of the Chkalov large-scale state grain farm (Zaporozhye Region). The son of a farm labourer, he began at the state farm as a shepherd. After completing short courses in tractor driving he began to work as a tractor driver, then became a combine operator. Later on he graduated from the Institute of Mechanization. He has been decorated by the government for his distinguished work.

Or another example—Piskarev, the director of the Ust-Medveditsk State Cattle Farm (Stalingrad Region) the son of a workingman. His career can be stated briefly: he worked in the engine room of a Volga steamer, then at a corn mill. Later he became an artificer and gave up his trade to study at an agricultural institute. Eventually he became the technical director of the October State Farm (Voronezh Region). Now he directs a great stock farm.

Many state farms are already models of good organization and

efficiency.

One of the oldest and best-known state farms, not only in the U.S.S.R., but also to people abroad, is the "Gigant" Grain Farm in the steppes of the North Caucasus. In the last two years it has averaged about 0.8 tons of winter wheat per acre from an area of 39,500 acres. This farm also has 3,200 head of cattle, 5,400 sheep, 700 pigs, 260 horses. In two years it has produced 10,500,000 rubles' worth of foodstuffs and made a profit of 2,785,000 rubles.

The "Kirov" State Grain Farm, situated in an arid zone of Kazakhstan which has a rainfall of only 220 mm. a year, now gets good harvests regularly. In 1938 it averaged 0.8 tons of grain per acre from an area of 61,750 acres.

In the "Karavayevo" State Dairy Farm the yield of milk in 1938 was 6.15 tons per cow from 251 cows. Almost half of the livestock are cows which have calved for the first and second time and give an unusually high yield of milk for their age. Since her second calving, for instance, the cow "Blagodat" has yielded 9 tons of milk. The record making cow "Poslushnitsa" which was reared on the same farm yielded 16.3 tons of milk during her sixth lactation (1937 and the beginning of 1938).

The Proletarsky Sheep Farm has 22,000 head of *précoce* (early maturity) sheep. In 1938, 122 lambs were obtained per hundred ewes, and in 1939, 147 winter (February) lambs per 100 ewes were obtained in six flocks. This state farm shears an average of 9.9 lbs. of wool per year per sheep. All the ewes on this farm have been subjected to artificial semination for some years past.

Another pedigree sheep farm, the "Bolshevik" (Orjonikidze Territory) has 34,000 sheep of the "Soviet Rambouillet" breed, a cross between the local merino and the American Rambouillet. The Soviet Rambouillet combines the weight of the American Rambouillet with a heavy fleece. The best of them weigh 264 pounds and higher and yield 35 pounds of wool at a shearing. The average fleece per sheep on this state farm weighs 13.9 pounds. In 1938

the state farm sold 6,000 pedigree breeders to the collective farms.

The achievements of the state farms are very considerable. But even greater tasks face them during the Third Five-Year Plan period.

One of the aims of the Third Five-Year Plan for the Economic Development of the U.S.S.R. (1938-42) is, by continuing the mechanization of agriculture, to increase the productivity of labour in the state farms and make thriving concerns of them all.

MACHINE AND TRACTOR STATIONS

By A. Oskin

ORDER OF LENIN. HARVESTER COMBINE OPERATOR

MEMBER OF THE SUPREME SOVIET OF THE U.S.S.R.

ON November 8, 1917, one day after the establishment of Soviet power in Russia, the Council of People's Commissars issued its decree on the land.

Under this law private property in land was abolished for all time and the land was declared state property, the property of the people. More than 370,000,000 acres of land formerly comprising the estates of the landed proprietors, the monasteries and the royal family were added to the peasants' holdings.

The Soviet Constitution declares:

"The land occupied by collective farms is secured to them for their use free of charge and for an unlimited time, that is, in perpetuity." (Article 8).

. . . The years passed. The Soviet Union completed two Five-Year Plans of economic development. In the space of ten years (1929-1938) large-scale industry in the U.S.S.R. increased its output by almost 400 per cent. A new array of mighty industrial plants, mills and factories arose throughout the country.

The Rostov Agricultural Machinery Plant alone produces more machines per year than were produced by all the agricultural machinery plants of tsarist Russia.

Great tractor works were built at Stalingrad and Chelyabinsk, plants for the production of harvester combines were opened at Saratov, Zaporozhiye and Rostov. In machine building and tractor production the U.S.S.R. advanced to first place in Europe and

second in the world while in output of harvester combines it rose to first place in the world.

Thanks to large-scale socialist industry the Soviet Union was able to reorganize agriculture on completely new lines. By now, 18,800,000 peasant households, 93.5 per cent of the total number, had joined collective farms. The Soviet government supplied the collective farms with hundreds of thousands of tractors and harvester combines, a vast number of motor lorries, tractor-drawn farm implements and other machines.

This equipment, the last word in technical progress, is concentrated in the Machine and Tractor Stations (M.T.S.), which have become the principal state enterprises in the countryside, servicing over 250,000,000 acres of collective farm land.

In 1930 the U.S.S.R. had 158 Machine and Tractor Stations. By the beginning of 1939 their number had increased to 6,350, a great network extending from the White Sea to the Black Sea, from the Western frontiers to the Far East. In 1938, the Machine and Tractor Stations serving the collective farms had 130,000 harvester combines, 160,000 motor trucks, 105,000 threshing machines and 394,500 powerful tractors, and their number is steadily increasing. In addition there are hundreds of thousands of other machines and mechanical appliances in the Machine and Tractor Stations as well as a large number of well-equipped repair shops.

The Machine and Tractor Stations are financed by the state, and have no farms of their own. In 1938 alone the state assigned 7,000,000,000 rubles to the Machine and Tractor Stations. The work of each M.T.S. is planned in conformity with the work of the collective farms which it serves.

The stations work on the basis of a standard contract with the collective farms in their area.

Under this standard contract, which is legally binding, the particular M.T.S. undertakes to do certain work of a definite quality by a definite date in the given collective farm. On the other hand,

the collective farm has specific agrotechnical and other duties to perform. It must do part of the work, mainly of an auxiliary nature, and provide draft animals for hauling supplies of fuel for the tractors, and other purposes.

Through the Machine and Tractor Stations the state plans the process of production and the introduction of the latest scientific farming methods on a wide scale, thus ensuring big harvests regularly.

The work performed by the Machine and Tractor Stations is paid for in kind by the collective farms according to the rate fixed for each class of work. Thus, for threshing, the collective farm gives the M.T.S. from 4 to 6 per cent of the grain threshed by M.T.S. threshers.

The Machine and Tractor Stations render the entire proceeds to the state.

The Machine and Tractor Stations are well staffed with engineers, mechanics, agronomists, expert bookkeepers and accountants, land reclamation experts, hydraulic engineers and other trained men. Here we might add that the Machine and Tractor Stations are bound by contract to train a regular contingent of the collective farmers for skilled work.

During eleven months in 1938 the amount of tractor work performed in the collective farms by the Machine and Tractor Stations came to the staggering figure of 481,150,000 acres of conventional ploughing.* Collective farm harvests have increased correspondingly. In tsarist Russia the harvest of grain crops never exceeded 80,000,000 tons, while in 1937 the grain harvest in the U.S.S.R. reached 111,500,000 tons.

Before the revolution the cultivation of tea, citrus fruits, soya beans, kenaf, hemp, sesame, and rubber plants was unknown in the Russian countryside. Now, with the help of the Machine and Tractor Stations the collective farms are making splendid pro-

* i.e., Ploughing plus all forms of tractor work (sowing, harvesting, etc.)

gress in the cultivation of these and many other plants.

The concentration of machines in the Machine and Tractor Stations and the merging of the peasant farms into collective farms controlling vast areas of land have made it possible for machinery to be used in agriculture to the utmost advantage.

In 1938 the average area farmed per M.T.S. tractor was 1,015 acres.

Stakhanovite tractor drivers cultivate as much as 5,000 acres with wheel tractors and up to 12,500 acres with caterpillar tractors.

The tractors on the collective farm fields do not work singly, but in teams consisting of a number of tractors with the requisite outfit of appliances and agricultural machines. The work of these teams is directed by mechanics and agronomists. Skilled men from the M.T.S. repair shops see to it that the machines are kept in good order. The M.T.S. tractor teams are attached to a definite collective farm for the whole season to complete all the work undertaken in the contract.

Through the Machine and Tractor Stations the collective farms are also served with harvester combines which have become the principal harvesting machines in the U.S.S.R. harvesting about one-half of the total collective farm area.

In one season, harvester combine operator Borin of the Steinhart Machine and Tractor Station, in the Krasnodar Territory, harvested 4,940 acres of land under cereals, an average of 185 acres a day. 2,950 tons of grain passed through his bunker.

Thanks to such thorough mechanization, farm jobs take much less time than formerly, and the collective farmers are able to get the sowing and harvesting done quickly without losses.

Prokhorov and Susopatieva of the Red October Collective Farm, Vozhgal District, Kirov Region tell us what a difference the Machine and Tractor Stations have made.

"In the old days the peasants had to sweat blood for every pood of grain. We got from 300 to 375 pounds from the acre

Now we have the Machine and Tractor Station to help us. In 1½ hours a tractor ploughs 2½ acres, and a combine harvester harvests 2½ acres in half an hour. The yield per acre has increased to 1,500 and 3,000 pounds."

The figures for 1937 show that collective farm labour is six times more productive than was farm labour in tsarist Russia. Up-to-date mechanization is making agricultural labour more and more like industrial labour.

The collective farms have their own electric power stations, clubs, theatres and moving picture houses, laboratories, schools, nurseries, kindergartens, hospitals, athletic fields and radio centres. Farm life is rapidly coming up to urban standards.

Thousands of peasants' sons and daughters are studying in universities. Last year alone agricultural colleges gave the Machine and Tractor Stations and collective farms 12,732 experts in agronomy, veterinary science, scientific animal husbandry, irrigation, hydraulic land reclamation, mechanics and surveying. Every year about a million persons take courses in mechanics.

In the village of Moskovskoye, Izobilensk District, Orjonikidze Territory, there are five schools with a total attendance of 1600 children and a teaching staff of 43. There are six stores, a hospital, a clinic, a drug store, a club with a library, a central school for collective farmers from the surrounding districts and, of course, a Machine and Tractor Station—the industrial centre of the new, collective farm village.

The number of professional people in Moskovskoye is constantly increasing. Two local peasants have become professors, seven—doctors, thirty-six—teachers, twelve—agronomists, eight—engineers, and ten hold commissions in the army. Before the advent of collectivization the two brothers, Michael and Alexei Tolin worked as farm hands for kulaks. Now Michael is a colonel in the Red Army and Alexei is a doctor. Ivan Chaiko, formerly a poor peasant, is now a scientist and lectures at a college in

Leningrad.

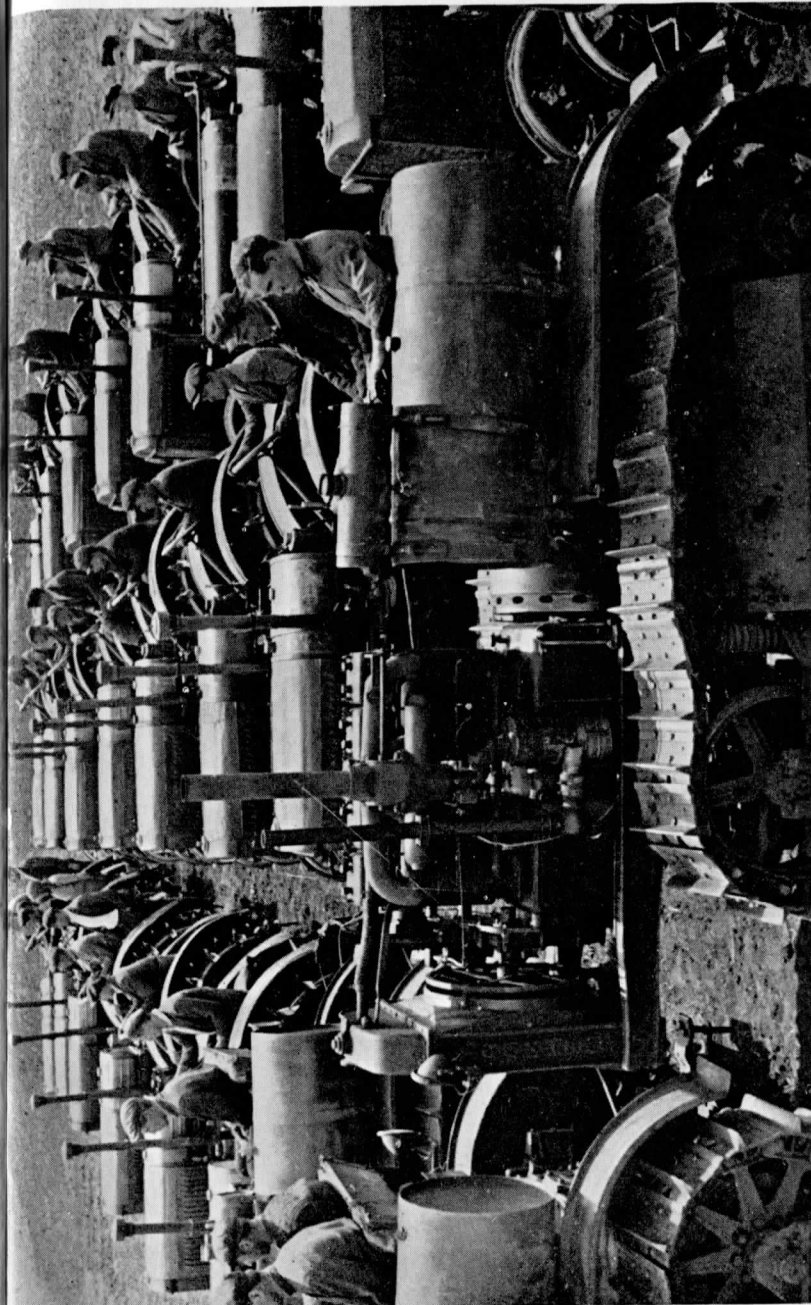
Or take another village, Koltsovka, Vurnarsk District, Chuvash Autonomous Soviet Socialist Republic. Not so long ago the chairman of the local collective farm was Korotkov. He proved to be a capable executive and was promoted to a higher post. Now he is the People's Commissar of Agriculture of the Chuvash Republic.

There are many villages like Moskovskoye and Koltsovka in the U.S.S.R. Collective farmers become People's Commissars, tractor drivers become academicians, milkmaids become members of the government. Such are the opportunities open to all in the collective farm villages.

In the old days there was no mass training of technical personnel for work in the countryside, there were no schools for young talent like the machine and tractor stations which are now training skilled labour for our socialist farms. New figures have appeared on the rural scene, people with semi-industrial professions formerly unheard of in the countryside. By the most modest estimates the Soviet countryside has 1,500,000 tractor drivers and harvester combine operators, 124,000 lorry drivers, 240,000 collective farm chairmen, over 535,000 field foremen and approximately 264,000 stockfarm managers and foremen.

This vast army of skilled people is working hard to increase the productivity of farm labour. In its front ranks are the Stakhanovites, people who know their work to perfection, people who have introduced new methods and efficient organization of work.

Take the Stakhanovites of the Kaganovich M.T.S. in the Krasnodar Territory. At this station, which employs 25 tractor teams, there are 200 tractor drivers. A hundred and forty-eight of them fulfil their assignments 200 per cent and over. Five of these teams consist entirely of Stakhanovites. Each tractor driver in these teams ploughs 18 acres with three-coulter ploughs to a depth of 7.9 inches. And the assignment is 8.6 acres.



MACHINE TRACTOR STATION

The assignment for harrowing is 98 acres but these tractor drivers do 195.5 acres. The assignment for scarifying is 42 acres, they do 138.8 acres. The days' assignment for combine-harvesting is from 19 to 22 acres. Some of our Stakhanovite combine operators harvest 1,730 acres of grain, in the 22 days of the harvesting season.

Thousands of Soviet combine operators harvest from 2,500 to 5,000 acres in one season.

The Stakhanov movement in the countryside is advancing by leaps and bounds.

Millions of peasant families receive from 16 to 25 and more tons of grain a year in their collective farms. In addition to this income in kind the collective farmers receive cash. Exceptionally large money incomes are received by the collective farmers in the cotton, flax, stock-raising, sugar beet-growing and citrus fruit districts.

Before the advent of collectivization, Gerassimov, now a member of the Dimitrov Collective Farm in the Narimanov District, Stalingrad Region was a poor man. In the collective farm he became an expert farmer, a Stakhanovite. In 1938 his share of the collective farm income was 14,000 rubles plus several tons of grain, vegetables and other produce.

In 1938 in the Khanlar District of the Azerbaijan S.S.R. the Thaelman Collective Farm, consisting of Germans, received 4,450,000 rubles for its produce. The family of Robert Schmidt received 7,500 rubles in cash and 4,700 rubles worth of farm produce. In 1938 this collective farm spent 778,000 rubles on building extensions and cultural service for the collective farmers.

There are tens of thousands of collective farms like this one in the U.S.S.R.

In 1938, with my brother Arkhip, a combine operator like myself I harvested the collective farms in, the Ilek District of the Chkalov Region. In 41 days the two of us together harvested

E2



12,933 acres. Our earnings came to 42,315 rubles.

More and more collective farms are getting the benefit of M.T.S. service, and increasing their incomes beyond the million ruble mark. In the Nikolaev Region in the Ukraine 35 collective farms have become millionaire farms. In the Temruk District, Krasnodar Region 20 collective farms each receive incomes of over a million rubles. In the Ferghana Region, Uzbek S.S.R. in 1938 the number of millionaire collective farms rose to 320.

Under the collective farm system life in the villages of the U.S.S.R. has become prosperous and cultured. Socialist industry and collectivized agriculture complement each other, each assisting the other to attain further progress.

LIVESTOCK RAISING

By Y. Liskun

MEMBER OF THE ACADEMY OF SCIENCES OF THE U.S.S.R. ORDER OF LENIN.

THE Great October Socialist Revolution which transformed the entire economic life of the country has brought about a material change in the sphere of stock-raising as well. In tsarist times stock-raising was practically the most backward branch of agriculture in Russia. The average annual yield of milk per cow was about 1,400 lbs., the average annual yield of wool per sheep amounted to 2.86 lbs., and the average carcase of beef equalled 220.5 lbs.

There was no "demand" for the science of animal husbandry in tsarist Russia; and the only institution that dealt with the scientific problems of animal husbandry was the Zoo-technical Laboratory founded by the Ministry of Agriculture in 1905.

At the time of the Revolution in 1917, there were altogether three colleges of agriculture maintained by the state. Three more schools of agriculture, which offered a higher course of study, were maintained by public organizations.

In the small and scattered peasant farms of tsarist Russia stock was raised only for consumption and to supply manure. Therefore, while the number of head of stock was fairly large, stock raising played rather a small part in the economic life of tsarist Russia.

Under such conditions science, naturally, played an insignificant role. In the whole of tsarist Russia there were 74 livestock experts with a scientific training. The budget of all the scientific

institutions working this field totalled about 100,000 rubles.

An entirely different situation obtains in the U.S.S.R. at present. The problems of improving the stock and raising its productivity are dealt with in eighteen large scientific research institutes, 78 regional and republican Zootechnical stations with 296 branches in various parts of the country, and more than a thousand small laboratories functioning in collective farms. The budget of these scientific research institutions amounts to about 51,000,000 rubles a year.

In addition to this, fifty animal husbandry departments carrying on scientific research work have been organized in universities and other higher educational institutions.

The existence of a close contact between the science and practice of stock-raising gives us the assurance that in the very near future we shall be able to direct at will all the processes of reproduction of the herd of farm animals, as well as the output of the produce of stock-raising. The magnitude of the problem may be appreciated if it is borne in mind that the Soviet state sets itself the aim to provide a supply of the products of stock-raising that will fully meet the requirements of the population.

The scientific agricultural institutions of Soviet Union have mastered, during the brief period of their work, all that is known to world science in the sphere of animal husbandry. Nor is this knowledge confined to scientists alone. Tens of thousands of Stakhanovite workers engaged in stock-raising employ scientific methods in their work and display creative ingenuity in their application. As a result, they have succeeded in raising the productivity of native breeds to a level which was formerly considered unattainable.

An annual yield of over 3.5 tons of milk per cow; a progeny of pigs weighing more than 1.5 tons on hoof from one sow; an average of over 11 pounds of wool per sheep of the merino-Précose, Rambouillet and native merino breeds; a daily increase in

the weight of porkers amounting to 3.5 and even to 4.5 pounds per head; 165 and more eggs per laying hen a year; over 265 pounds of honey per beehive; 100 per cent calving of cows and foaling of mares; 100 per cent preservation of calves and colts; 24-26 piglings per sow; 135 lambs per 100 caracul ewes, 265 lambs per 100 Romanov ewes and more than 140 lambs per 100 merino ewes—such are some of the results obtained by an intelligent application of the achievements of world science in the sphere of animal husbandry.

Soviet achievements in every branch of the stock-raising industry are either on a par with the world records or surpass them. We may mention the record of "Poslushnitsa," a cow producing 16 tons of milk a year (Karavayevo State Farm, Yaroslavl Region); or the records of some Soviet racehorses, such as that of "Oulov" which covered 0.99 miles in 2 minutes 3.4 seconds, and 1.98 miles in 4 minutes 20.75 seconds, that of "Pyetushok," a Russian-American breed, which covered 0.99 miles in 2 minutes 3.5 seconds, that of "Podagra" which covered 1.98 miles in 4 minutes 21.9 seconds, etc.

The breeds of animals are being improved by the method of crossing the native types with pedigree stock, as well as with the better local breeds. The state farms and collective farms are thus evolving new breeds ensuring an unprecedented productivity.

Soviet science has accomplished a great deal of work in the matter of selecting the breeds that will best serve the purpose of improving the herd in the Soviet Union. At present we have a scientifically elaborated plan for the proper territorial distribution of the various breeds that are used to improve the country's livestock.

In order to accelerate the process of improving the stock with the best thoroughbred producers, Soviet science has perfected the technique of artificial fertilization of sheep, cattle, hogs, horses, rabbits, poultry, and even bees. A number of special apparatus have

been designed, and the methods of artificial fertilization have been so simplified that every shepherd can apply them. The sperm of one ram is used to fecundate 5,000, and in some instances as many as 10-12,000, ewes in a season; the sperm of one pedigree producer serves to fecundate 1,200 mares or 1,000 cows.

Important contributions to the science of artificial fertilization have been made by O. Neuman, V. Milovanov and a number of other prominent scientists.

Over fifty million head of livestock have already been obtained in the U.S.S.R. by the application of the method of artificial fertilization, which makes it possible greatly to speed up the improvement of the herd and the introduction of new breeds. The further perfection of the methods of artificial fertilization will open up still greater possibilities along these lines.

Soviet science has been able to register important achievements as the result of experiments in cross-breeding with a view to combining the best qualities of a number of breeds in one new breed. The most noteworthy achievements in this sphere are those of M. Ivanov, member of the Academy of Sciences of the U.S.S.R. He obtained a new breed of sheep—the Askanya Rambouillet—combining the best qualities of the American and native Rambouillet. The Askanya Rambouillet is already superior to the American breed in point of hereditary transmission, wool yield and weight on hoof.

Academician M. Ivanov has also produced a new breed of hog—the large white Askanya—combining the qualities of the native southern Russian variety and those of the large white English breed. The new breed is even somewhat superior in quality to the large white English hog, and at the same time it is better adapted to the conditions of southern Ukraine.

Soviet science has achieved considerable success in elaborating the methods of obtaining new breeds. By applying these methods, livestock expert Filyansky, of the Bolshevik State Farm, has pro-

duced a new breed of sheep—the Caucasian Rambouillet. The livestock experts of Kazakhstan have produced a new breed of sheep, the “curducoce” combining the fleece of the merino with a heavy tallow protuberance (steatopyga) on the rump, which is of great advantage in desert and semi-desert conditions.

By applying the Darwinian theory in practice, Soviet animal breeders have demonstrated the great potency of environment and external conditions, in the form of feeding and maintenance, as a means for the transformation of animals. The author, for instance, has succeeded in proving that with proper feeding and good tending the native Kalmyk and Kirkhiz cattle display an early maturity which makes these native breeds practically akin to short-horns and Herefords.

At the age of two years and four months, the young that have been brought up according to my method easily reach a weight of 575-615 lbs., of a quality which is on a par with the meat of the best breed of beef cattle. This method has now been introduced in 79 large state farms.

Soviet science is studying the chemical composition and nutritive qualities of various kinds of feeds produced under various climatic, soil and farm conditions. Particular attention is being paid to the mineral ingredients of feeds and fodder. Soviet science is also considering and elaborating the hypothesis of Academician V. Vernadsky to the effect that feeds contain elements of rare soils which apparently play an important role in the nourishment and development of animals, as well as of man.

The contributions of Soviet science in the sphere of animal husbandry include a number of new works dealing with the appraisal of the biological characteristics of feeds. Professor A. Solun has succeeded in establishing the vital importance of the presence of vitamin “A” in feeds for the proper nourishment of animals with young. Feeding mares products with the proper vitamin “A” content safeguards them against miscarriage and insures a strong and

enduring progeny. Similar results have been obtained in the case of sheep. Particular success has been obtained in demonstrating the effect of vitamin "A" on the development of the young of the merino sheep.

The study of the biological characteristics of feeds will enable us to make up proper feed rations and thus to solve the problem of proper feed combinations.

This problem, as well as the question of mineral nourishment, is being successfully dealt with, among others, by the Zootechnical station in the city of Pushkin, Leningrad Region, working under the direction of Professor M. Dyakov.

By changing the methods of the care of animals and adapting them to the individual peculiarities of the various types of livestock, the Stakhanovites of the livestock industry have succeeded in obtaining considerably higher average rates of productivity and have laid the foundations for a new and higher level of scientific stock-raising.

One of the greatest achievements of Soviet science is its close contact with production. This contact bids fair to bring about exceptional results. Whole districts are at present vying with each other in a spirit of socialist emulation for a higher productivity of stockraising. The collective farmers of the Ramensky and Lukhovitsky Districts, Moscow Region, have already achieved a milk yield of three tons and more per cow.

By applying scientific methods, the Soviet stock-raising industry will undoubtedly succeed in the near future in materializing all the vast possibilities offered by stock-raising carried on on a large scale and according to plan.

It must also be pointed out that the state plan for the development of stock-raising, which is drawn up for every year on a strictly scientific basis, is in itself a great achievement. It was as a result of planning and of the struggle for the fulfilment of the plans that in the five years 1933-1938 the herd of cattle increased

in the U.S.S.R. by 64.6 per cent, the number of sheep and goats increased by 104.2 per cent, and that of hogs by 152.9 per cent. In the same years the herd of cattle in fascist Germany diminished by 659,000 head. The increase in the number of sheep in the Soviet Union in the one year 1937 alone amounted to twice the entire flock of sheep in Germany. The number of sheep in the U.S.S.R. increased in 1937 by 10,700,000 head, whereas the total number of sheep in Germany in 1937 amounted to 4,683,569 head.

Stock-raising in the U.S.S.R. made further strides in 1938. In that year the number of horses in collective farms increased by 8 per cent and that of colts by 9 per cent; the number of cattle increased by 6 per cent, that of hogs by 7 per cent and that of sheep and goats by 19 per cent.

These are rates of growth which no other country in the world can boast of.

RAILWAYS

By V. Obratzov

ORDER OF LENIN. MEMBER OF THE ACADEMY OF SCIENCES OF THE U.S.S.R.
MEMBER OF THE SUPREME SOVIET OF THE U.S.S.R.

THE vast territory of the Soviet Union stretches from the Black Sea to beyond the Polar circle, from the Gulf of Finland to the Sea of Japan. The wealth of the country multiplies with every passing year. New towns, industrial centres, mines and factories spring up in various parts of the Soviet Union. Deposits of gold and other rare metals are discovered in its mountain regions. The collective farms and state farms yield ever increasing harvests.

The importance of the railway system for the U.S.S.R. can be compared with the importance of the mercantile marine for Great Britain. The part played by Soviet railways in the general life of the country is steadily increasing. The rapid growth of industry and agriculture, the development of new regions and the strengthening of the country's defence powers require a highly efficient railway service and the Soviet Government is devoting much attention to developing and securing the smooth running of the nation's railways. In recent years the railway system has advanced to one of the foremost places in Soviet economic life.

The Soviet Government received a meagre heritage from the tsarist regime. War and intervention led to the destruction of some 4,500 railway bridges with a total length of over 60 miles. The Murman railway, the Amur railway and other lines, construction of which was begun during the World War, were never brought to completion by the tsarist government. Practically no repair work was done for seven or eight years, railway ties were not changed and the roadbed was not renovated. Thousands of

miles of lines, numerous water-towers and station buildings were reduced to ruins. Dilapidated cars and battered locomotives filled the sidings of railway junctions. Traffic declined heavily. Average daily car-loadings fell from 27,400 in 1913 to 6,200 in 1918, which was only 22.8 per cent of the 1913 figure. During the same period the volume of traffic declined from 40,900,000,000 ton-miles to 8,700,000,000 ton-miles.

It should be added that of the 43,798 miles of railways in tsarist Russia in 1913, over 7,000 miles were ceded to Poland, Lithuania and other border states. The U.S.S.R. was left with 36,300 miles of line.

The Soviet Government left no stone unturned in its efforts to revive the railway system without resorting to foreign loans.

The revolutionary enthusiasm of the masses, the splendid response of the railway workers to the appeal of the Soviet Government, their labour enthusiasm and improved working conditions made it possible to surpass the pre-war volume of traffic by 1926-27.

Carloadings increased steadily. In 1913 average daily carloadings amounted to 27,400 cars, in 1918 this figure dropped to 6,200 but rose to 28,800 in 1927. Freight traffic increased at an even greater rate. In 1913 the volume of freight traffic amounted to 40,900,000,000 ton-miles, in 1918 it dropped to 8,700,000,000 ton-miles but reached 51,200,000,000 ton-miles in 1927 and has continued to advance at an even higher rate in the subsequent years.

The Soviet railways experienced a particularly rapid growth in the period between 1928 and 1937. In 1928 the Soviet Government adopted its First Five-Year Plan for the economic development of the country which laid down a definite programme of expansion for each year. This plan was fulfilled ahead of schedule. The Second Five-Year Plan (1933-37) was likewise fulfilled successfully. In 1938 the Soviet Union began the fulfilment of its Third Five-Year Plan which will be completed in 1942.

The Five-Year Plans stipulate definite programmes for each branch of industry and agriculture. Every factory, mill, railway and depot is given a specific programme for the five year period. The nation judges the quality of work of industrial establishments and their general efficiency by the fulfilment of their production plans. In this way the work of every enterprise is under the constant control of the people and the fulfilment of production schedules becomes a matter of honour for the workers of every factory.

The planned development of economy has led to a marked improvement in the operation of the railways. By the end of the First Five-Year Plan period average daily carloadings grew to 51,400 and to 89,800 by 1937. By the beginning of the Third Five-Year Plan period carloadings on Soviet railroads were over three times as high as before the war.

The volume of freight shipped increased by leaps and bounds—from 156,200,000 tons in 1928 to 267,900,000 tons at the end of the First Five-Year Plan period and 517,300,000 tons in the last year of the Second Five-Year Plan period. Soviet railways transported almost four times as many passengers in 1937 as in 1928.

Coal, oil, ore, and metal account for 42 per cent of the aggregate volume of freight traffic. Taking the figures for 1928 as 100, shipments of coal and coke amounted to 383 per cent in 1937, ore to 435 per cent, metal to 460 per cent and timber to 270 per cent. These figures testify to the tremendous development of industry in the Soviet Union.

The freight density of Soviet railways exceeds that of any other country, as may be seen from the following table:

Traffic per mile of line in operation (in ton-miles)

	1913	1929	1936	1937
U.S.S.R.	689,000	909,000	2,416,000	2,589,000
Germany	788,000	944,000	722,000	—
Great Britain	—	589,000	514,000	—

Such is the progress made by the Soviet railways in the last ten years.

It must be pointed out that the radical reconstruction of the railway system began actually in 1935 with the appointment of L. Kakanovich to the post of People's Commissar of Railways. Since then the rolling stock of Soviet railways has been replenished by the introduction of two new types of powerful locomotives—the "FD" (named in honour of Felix Dzerzhinsky) for freight traffic and the "JS" (Joseph Stalin) for passenger traffic. These locomotives exceed the old "EM" and "SU" type locomotives by 50 per cent in traction power. The "FD" and "JS" locomotives are the first in the U.S.S.R. to be equipped with mechanical stokers.

The introduction of Diesel-electric locomotives, which were unknown in pre-revolutionary Russia, marks a great step forward in Soviet railway engineering. Diesel-electric locomotives of the "E-EL" and "VM-20" (V. Molotov) type have proved very efficient and are being used extensively on the Central Asiatic railways which pass over arid country.

Great progress can also be recorded in the electrification of the railways. This work was facilitated by the fulfilment of the national electrification plan adopted by the Soviet Government on Lenin's initiative.

There were no electric railways in Russia prior to the Revolution. The first electric line was built in 1926; it was a suburban line between Baku and Sabunchi. At present the U.S.S.R. has 1,116 miles of electrified railway, of which 198 miles are suburban lines and the remainder trunk lines.

The introduction of electric traction necessitated the construction of high-power electric locomotives. This problem was solved by Soviet industry, which has provided the railways with the "VL" (V. Lenin) electric locomotive for passenger and freight traffic,

the "SS" locomotive for freight traffic and the "PB" for passenger traffic. All these locomotives use 3,000 volt direct current. The "PB" locomotive can develop a running speed of 87 miles, the "VL" 53 miles and the "SS" 43 miles per hour.

The latest innovation in Soviet railway technique is the new "SO" (Sergo Orjonikidze) condenser locomotive. The condensing installation of this locomotive converts the steam discharged by the cylinders into water to be used again for steam. The original water supply can pass through the condensation process from 10 to 13 times, providing a steady flow of pure distilled water for the boilers. The "SO" locomotive can run from 620 to over 1,000 miles without taking water. The importance of this locomotive is especially great in arid districts and where water is of poor quality. Another feature of the condenser locomotives is that it reduces fuel expenditure by 15 to 20 per cent.

The number of condenser locomotives in use on Soviet railroads is steadily increasing. In 1938 alone Soviet plants built 406 "SO" condenser locomotives as compared with 399 built during the entire First Five-Year Plan period. Other types of locomotives are also being fitted with steam condensation installations. The Voroshilovgrad Locomotive Works has produced a new type of "FD" condenser locomotive, the largest of its kind in the world.

The Kolomna Locomotive Works has produced a new type of locomotive, the 2-3-2, with a running speed of 93 miles per hour; a similar locomotive has been built by the Voroshilovgrad Works with an even higher running speed (112 miles per hour). The Kolomna locomotives are used on the Red Arrow Moscow-Lenin-grad express.

The Kolomna Locomotive Works has also produced and is now testing a new type of high-pressure locomotive equipped with a uniflow boiler. Another type of high-pressure locomotive is being designed at the Voroshilovgrad Works and will be placed on the

line next year. The Voroshilovgrad plant is also constructing an experimental steam-electric locomotive, designed by Engineer Meizel. Its efficiency will be more than double that of the ordinary steam locomotive.

Both in industry and in railway transport the U.S.S.R. has surpassed all other countries in rate of development. This is brought out for example by the increase in the number of locomotives on the lines. During the five years from 1927 to 1932 the Soviet Union produced 3,412 locomotives as against 458 locomotives built in 1927. During the Second Five-Year Plan period (1933-37) the U.S.S.R. built 5,957 locomotives, of which 1,215 were built in 1937 alone.

The wagons in use on Soviet railways have been completely reconstructed. They have been fitted with automatic brakes and one-fourth of all wagons in use have been equipped with automatic coupling. The standard 16 ton railway wagon is now being replaced by powerful four-axle box wagons, gondola cars, hopper cars, tank cars, and flat cars of from 50 to 70 tons capacity.

Soviet factories are now preparing for mass production of a new type of all-metal passenger coach which will afford every modern convenience.

The following figures show the renovation of wagons in use on Soviet railways. From 1927 to 1932 the Soviet railways were supplied with 66,361 new goods wagons and 4,092 new passenger coaches. From 1933 to 1937 Soviet industry produced 170,375 goods wagons and 5,315 passenger coaches. In 1935 alone about 70,000 new vehicles were put into service.

The construction of 216 repair shops, most of them good sized plants, was completed in record time. In addition to these, 64 depots, 17 wheel repair shops, automatic brake inspection and repair shops have been built and many shops have been reconstructed.

At the same time there has been a marked improvement in



"A RIVER TRAM"
On the Neva, Leningrad

station facilities. By 1937 over 22,000 mechanized and electrified inter-locking switches had been installed on the railways. Construction has been completed of 22 ordinary humps and 33 mechanized humps fitted with automatic retarders. Automatic block signals have been installed on 3,202 miles of line.

New lines are being built at a more rapid pace. Every year thousands of miles of new railroad lines are put into operation. During the last five years approximately 3,000 miles of second tracks were laid and about 3,700 miles of existing line were reconstructed. During the same period over 62,000 miles of line were overhauled and repaired.

Soviet railways have been provided with 54 track laying and repair stations equipped with the latest machinery. This makes it possible to perform repairs much more quickly with the use of ballasting machines, track graders, pneumatic sleeper-packing machines, motor rail-jacks, etc.

Railways are never closed down in the U.S.S.R. for lack of traffic, and the total length of line is steadily increasing. Between 1918 and 1936 the Soviet Union built over 9,000 miles of new line, while many additional lines have been completed. The rapid growth of Soviet railroads is graphically demonstrated by the following table:

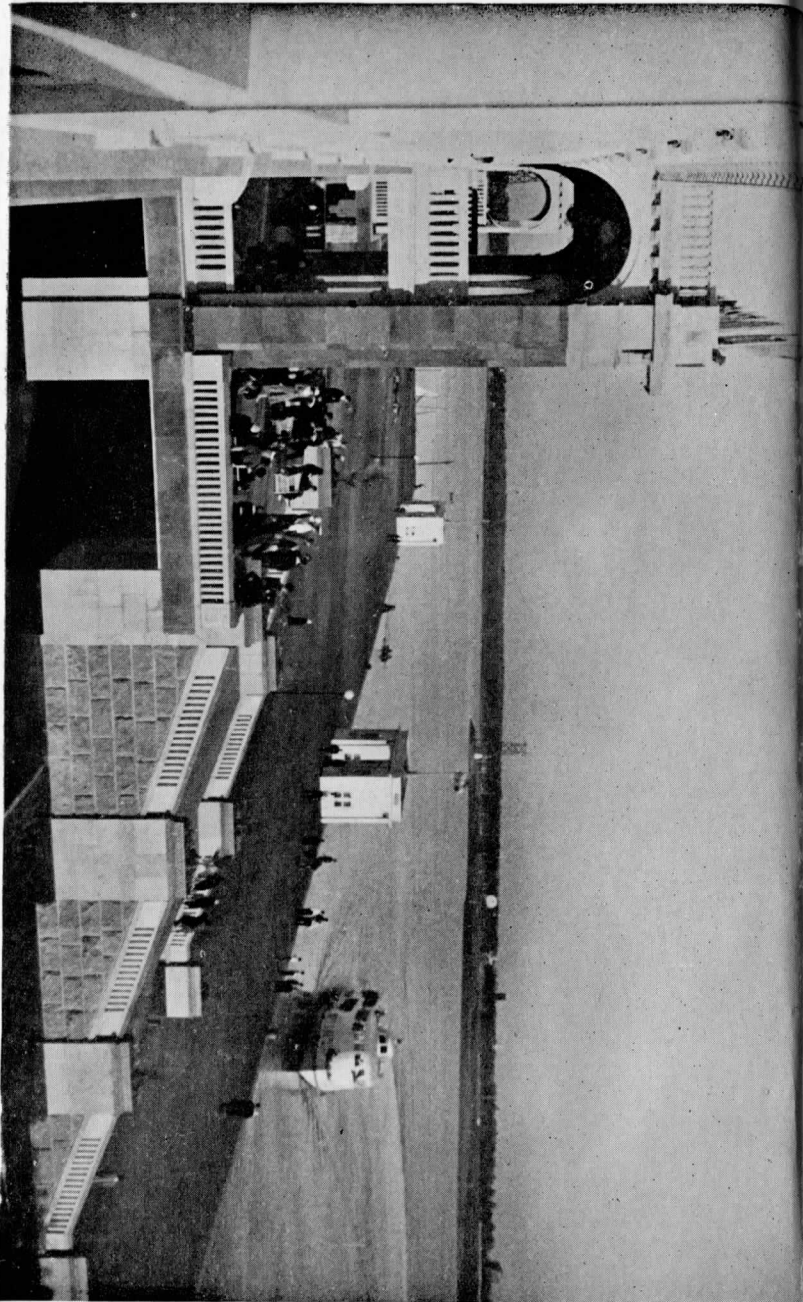
Aggregate mileage of Soviet railways

End of 1913	...	...	...	36,300 miles
End of 1929	...	...	...	47,700 miles
End of 1932	...	...	...	50,733 miles
End of 1936	...	...	...	52,700 miles

The development of the Soviet railway system was possible because the Soviet Government devoted much attention to training highly skilled engineers and workers for all branches of the system.

The number of institutes training railway engineers has increased sixfold since the revolution, the number of railway col-

2



leges has doubled and the number of technical and apprenticeship schools has increased almost elevenfold. During the years of the Second Five-Year Plan period Soviet institutes trained over 15,000 railway engineers and 34,000 technicians. The institutes of railway engineering now have a student body of over 21,000 and employ some 2,000 professors and teachers. Many thousand people attend railway colleges and apprenticeship schools.

An extensive network of study courses and classes has been established to provide technical training to railway workers after working hours. In 1938 these courses were completed by one million railroad workers. Technical training centres, offering courses in popular technology and hundreds of technical libraries and laboratories are doing work of first-rate importance in raising the skill and knowledge of the huge army of railway workers.

This work is already bearing fruit. The Stakhanov and Krivonoss movement, a movement of people who have mastered their job to perfection, has spread far and wide throughout the entire railway system of the country. This movement derives its name from its initiators, Alexei Stakhanov, a coal miner and Pyotr Krivonoss, a locomotive driver. Locomotive drivers like Krivonoss, Ognev, Tritskaya, and Mokarov have found the ways and means of raising the efficiency of locomotives. They have increased running speeds and the weight of trains, and are running their locomotives longer distances without repairs. Shunting foremen Krassnov, Kozhukhar, and others have devised methods of making up trains in a shorter space of time and improved the methods of marshalling wagons. The methods introduced by these and others foremost workers have more than doubled labour productivity.

The example set by Krivonoss and his followers served as a stimulus to all railway workers. The Krivonoss movement, a movement for technical progress and higher efficiency, has grown to be a mass movement. At present there are approxi-

mately 600,000 Stakhanovites on the Soviet railways. One thousand five hundred railway workers have been decorated by the Soviet Government and six thousand have been awarded the railway workers Merit Badge.

The initiators of this movement have been promoted to important executive posts in state and economic organizations. Makarov, erstwhile locomotive driver, is now assistant chief of the Central Locomotive Administration of the People's Commissariat of Railways. Another ex-locomotive driver, Ognev, is now general manager of the Dzerzhinsky Railroad; Tritskaya, also a former locomotive driver, has been appointed general manager of the Moscow Circuit Railway. Zakorko, a former dispatcher, is now general manager of the Stalin Railway and Kutafyev, also a former dispatcher, is general manager of the Southern Railway.

Increased labour productivity is attended by a rapid rise in wages. Locomotive drivers employed in passenger traffic earn upwards of 1,000 rubles a month; drivers employed in freight traffic average 850 rubles a month. The average monthly wages of railway workers in 1937 amounted to 284 rubles, which represents a 100 per cent increase against 1932.

The U.S.S.R. will witness still greater economic development under the Third Five-Year Plan. The fulfilment of this great plan necessitates the further development and improvement of the railway services.

The Third Five-Year Plan provides for the construction of 6,820 miles of new line, the laying of 4,960 miles of second track and the electrification of 1,141 miles of line.

The most important of the new lines to be constructed under the Third Five-Year Plan are the Akmolinsk-Kartaly line (part of the Stalinsk-Magnitogorsk trunk line), and the Kislyar-Astrakhan line. The completion of these lines will reduce railway distances by hundreds of miles. New railways are to be built in Georgia, Armenia, Azerbaijan, the Urals, Siberia, the Ukraine, and in the

central regions of the U.S.S.R.

Under the Third Five-Year Plan 37,300,000,000 rubles will be expended on capital construction on the railways, as against 20,700,000,000 rubles under the Second Five-Year Plan.

The plan also provides for an increase in the number of locomotives by 8,000, particularly condenser locomotives, which in the next few years will become the leading type of locomotive in use on Soviet railways for freight traffic. During the period of the Third Five-Year Plan 4,200 condenser locomotives will be placed on the line.

The railway system will receive 225,000 four-axle goods wagons and 15,000 passenger coaches; 300,000 goods wagons and 4,000 passenger coaches will be equipped with automatic coupling. Automatic brakes are to be installed on 200,000 wagons. The number of repair shops, both for locomotives and wagons, is to be increased, especially on the Ural, Siberian, Far-Eastern and Central Asiatic roads.

One of the provisions of the Third Five-Year Plan is the further extension and development of railway junctions. Large-scale construction is to be undertaken primarily on the Donbas-Krivoi Rog and Leningrad-Moscow lines, in the Eastern Ural districts, on the lines linking up the Northern territory and the Murman region with the central part of the Soviet Union, Western Siberia with Central Asia and on the lines running through the southwestern, western and eastern districts of the country.

The fulfilment of this plan will result in the increase of freight traffic from 220,000,000,000 ton-miles in 1937 to 316,700,000,000 ton-miles in 1942.

The Third Five-Year Plan holds out the prospect of further rapid development of the Soviet railway system.

WATERWAYS AND WATER TRANSPORT

By A. Blidman

ORDER OF LENIN. STAKHANOVITE STEVEDORE.

TWO oceans and twelve seas wash the shores of the Soviet Union. Its seacoast stretches for 26,703 miles. The vast expanse of the country is intersected by 500,000 rivers; its inland water surface includes two seas and 180,000 lakes. No country in the world can compare with the U.S.S.R. in the number and might of its navigable inland waterways which aggregate 248,400 miles.

In tsarist Russia the length of the navigable waterways open for traffic (excluding rivers serviceable for floating timber) was 27,945 miles. But only 22,356 miles were equipped with flash signalling installations for the guidance of mariners (buoys, beacons and so forth) which were of a primitive quality hardly comparable to the installations now in use. Under the Soviet Government the length of the navigable waterways (excluding those serviceable for floating timber) has increased by 37,881 miles and now comprises 65,826 miles.

The rivers of the Soviet Union are important not only as a means of traffic, they are at the same time a mighty source of electric power supply. As early as 1919, when the Civil War was raging all over the country, work was begun on the first Soviet hydro-electric power plant on the Volkhov River, not far from Leningrad. During the First Five-Year Plan period a gigantic dam was built across the Dnieper River, in the Ukraine,

which raised the level of the river by 123 feet. Prior to this the Dnieper rapids barred navigation over a considerable stretch of the river, but with the completion of the dam the rapids disappeared and the river became navigable from its upper reaches to the Black Sea. A triple chamber lock allows for the passage of craft. The Dnieper Hydro-Electric Power Plant with a capacity of 558,000 kilowatts generates more electric power than did all the electric power plants in tsarist Russia.

Dams have been built on the River Svir, near Leningrad, where a powerful hydro-electric power plant is now operating. Another hydro-electric power plant will be built here during the Third Five-Year Plan period.

In Karelia, cutting through granite hills and virgin forest, a canal, 141 miles in length, was built in twenty months. This canal links the White Sea with the Baltic Sea.

Another feat of engineering, but far more complicated, was the building of the Moscow-Volga Canal. Two hundred large works had to be built along its route of 79.5 miles. These works include eleven locks, eight earth filled dams, seven spillways, six flood-gates, five pumping stations, eight hydro-electric power stations, seven railway bridges and twelve bridges for other traffic. The whole scheme was completed in four years.

In the building of the canal 170 excavators were employed, hundreds of locomotives, motor-shunters, concrete mixers, hydro-monitors, thousands of conveyors and electric engines. Volga River water now washes the walls of the Kremlin in Moscow. Formerly the Moscow River was very shallow and hardly suitable for river craft. Now it has been linked up with the great Volga thoroughfare. The water course from the capital to Leningrad has been reduced by 685 miles and the distance to Gorky by 68 miles. The largest vessels can now sail the canal which can handle annually some 15,000,000 tons of cargo in any given direction.

The amount of capital invested in water transport is increasing

with every year. Under the First Five-Year Plan 1,258,000,000 rubles were assigned to this branch of the national economy. The sum appropriated under the Second Five-Year plan was 2,852,000,000 rubles. These sums were expended on building a modern technically well-equipped fleet of river and ocean going vessels, on refitting existing vessels, on the construction of new ports and reconstructing existing ports. New shipbuilding yards and dockyards were built in various parts of the country, while new equipment was installed in the existing yards, thus placing them on an equal footing with the up-to-date enterprises.

The Soviet salvage organization, Epron, has been doing excellent work these last fifteen years in raising shipwrecked or sunk vessels from the beds of seas, rivers and lakes. Many a vessel that was sent to the bottom by the foreign invaders during the Civil War has been given a new lease of life due to the efficient work of Epron and is now ploughing the rivers and seas under the flag of its Socialist country.

The fleet of the Soviet merchant marine is rapidly increasing in size thanks to the new vessels that have been built for it by the home yards. Many vessels were also ordered to be built or purchased abroad. The tonnage of the Soviet merchant marine has increased nearly three and a half times between 1923 and 1937. These vessels differ radically from the type of vessel formerly in use. In 1914 the deadweight of a sea-going vessel averaged 1,150 tons. At present the average deadweight is around 3,000 tons.

The Soviet Government has created a large and modern tanker fleet in the Caspian and Black Seas. The fleet of Soviet icebreakers is the largest and most powerful in the world. In the winter months these vessels ensure a free passageway for ships entering and leaving all icebound ports and also maintain a regular service between Murmansk and Vladivostok along the Great Northern Sea Route.

The Soviet river flotilla is practically new. During the two Five-

Year Plan periods, i.e., 1928-37, the carrying capacity of the fleet of river steamers and motor ships has almost doubled, while that of barges has trebled.

Many new vessels have been added to the river transport service. These include steamers and motor ships ranging from 150 to 1,200 h.p., cargo-passenger boats from 200 to 800 h.p., steamers having a deadweight of from 1,750 to 3,000 tons, refrigerators and numerous motor boats. Many new barges have been built for carrying oil in bulk and dry goods with a carrying capacity of from 1,000 to 4,000 tons. The Moscow-Volga Canal maintains its own fleet of comfortable passenger motor ships of from 280 to 700 h.p. The fleet of shallow draft motor boats for the lesser rivers is constantly growing.

This has considerably enhanced river and sea shipments. In comparison with the pre-war period the cargo carried by the Soviet water transport system during the Second Five-Year plan period has increased 300 per cent. The freight turnover of the Soviet water transport system aggregated 43,000,000,000 ton-miles in 1937.

In 1924 the freight turnover of sea-going vessels aggregated 3,900,000 tons. In 1937 it already exceeded 29,000,000 tons. During the last ten years shipments of timber have increased eleven times. In 1938 some 19,000,000 tons of oil were shipped by Soviet tankers.

The Soviet merchant marine has considerably increased its relative standing in the import and export trade. In 1929 Soviet vessels carried 10.3 per cent. of the country's foreign trade. By 1936 this had already grown to 35.9 per cent.

The Soviet flag can now be met in every port of the world and along all the main ocean and sea routes. Regular sailings are maintained between the U.S.S.R. and the U.S.A.

The importance of the water transport service as a means of conveying passengers is borne out by the fact that in 1938 the

fleet of Soviet river steamers alone carried some 67,000,000 passengers.

During the last few years almost all the previously existing seaports and river wharves have been thoroughly reconstructed and brought up to date. Ports like Leningrad, Odessa, Novorossisk, Murmansk, Nikolayev, Poti, Mariupol, Baku, Makhach-Kala, Vladivostok and Archangel have been fitted out with new moorings, portal cranes and other modern port facilities, not to mention elevators and cold storage plants. New ports have come into being such as: Onega, Soroka, Kandalaksha, Igarka, Naryan-Mar, Nogayevo, Kara-Bogaz-Gol, Port Ilyich and Otchemtchiry.

Antiquated river wharves and moorings have been re-built and fitted out with new and up-to-date equipment. Such river ports as Gorky, Stalingrad, Kiev, Dniepropetrovsk, Astrakhan, Rostrov-on-Don, Perm, Novosibirsk, Archangel, Moscow and Zaporozhye have changed beyond all recognition. Of the new river ports, Lenin Harbour on the Dnieper River, in the vicinity of the hydro-electric power station, deserves particular mention.

The new mechanical appliances with which the ports and harbours have been fitted have made the work of the stevedore much easier. In 1938 fifty per cent of all river vessels were loaded by mechanical means. As a result the labour-productivity of the stevedores increased many times over.

The new machinery installed in the ports and harbours has given rise to new vocations; crane operators, conveyor belt operators, engine men, electricians, chauffeurs, mechanical engineers now supplant the longshoremen of former days. Engineers, technicians and executive personnel for the river and sea transport service are being trained by the Academy of the Water Transport System, three engineering colleges, 29 technical training schools and 20 workers' colleges. The number of people enrolled in these schools and colleges totals 32,000. Apart from these educational establishments 60 schools are giving special vocational training to

juveniles. A large network of central and local courses for Stakhanovites are training or raising the qualifications of machine operators, foremen, stevedores, dispatchers and wharf superintendents.

With machinery as an auxiliary, the water transport workers are improving this machinery, making it work better, quicker, in a word, squeezing out of it all that is possible.

During the 1936 navigation season I was working in the coal harbour of the Kiev port. The loading was done by means of a "Yanvarets" conveyor belt. The loading capacity for this type of conveyor was fixed at 32 tons per hour. But owing to various slight defects it was never possible to load more than 28 tons. I made a careful study of the conveyor belt. A simple innovation, proposed by me, had an immediate effect. The brigade to which I belonged began to fulfill the scheduled rate 100 per cent. Further improvements which I introduced enabled us to increase the coal loadings to 40 tons per hour. Naturally, our earnings increased accordingly. We began to make 6.35 rubles an hour.

Continuing the work I had begun of improving the conveyor belt, I succeeded in bringing our loading up to 50 tons of coal an hour. The conveyor belt hardly managed to cope with the amount of coal the men were shovelling into the loading funnel. What I then did was to increase the speed of the conveyor belt from 2.95 feet per second to 3.9 feet, change the sheaves and lengthen the funnel. The result was that our loadings again began to grow—as much as 70-80 tons per hour.

I was bent, however, on improving this. I proposed a drive for 100 tons an hour. Doubting Thomases did not believe that this was possible. But I was convinced that it was. All that had to be done was to speed up the conveyor belt, instal a more powerful motor and enlarge the loading funnel so that it would be possible to shovel coal into it from three sides instead of one.

The day after this innovation was introduced the loadings

jumped up to 120 tons per hour, and in the presence of a special commission sent to test my innovation the result shown was 147 tons. Small craft which usually took about 40-50 tons of coal were now loaded inside half an hour.

I then began to test my innovation with sand loadings. Success was assured from the very outset. Loading jumped up to 290 tons per hour.

Our earnings also showed a considerable increase. Although we were making record loadings we were not in the least tired and would go home from work happy and jolly.

The press began to take an interest in our work. At first items began to appear in the paper published by the port authorities. Then articles began to be published in the Kiev papers and finally in the newspapers of the capital. In the Soviet Union inventions like mine, or for that matter any scheme for rationalizing industry, serving to make it more productive, are not the private trade secret of any individual or enterprise. They are immediately made public and introduced all over the country. The Stakhanovites of the Dniepropetrovsk port asked us to give them the details about our innovations. A brigade of Kiev stevedores immediately left for Dniepropetrovsk to demonstrate our methods to the local stevedores. After this the Kiev stevedores challenged the Dniepropetrovsk men to a Socialist competition.

We were bent on showing record results. We fixed up two additional conveyors of the "Samarets" type and linked them up with the main line. This enabled us to feed the main conveyor right from the coal dumps. The loadings jumped to the record figure of 214 tons per hour.

At a rally of inventors which was held in Moscow in the winter of 1936 I undertook to increase the productivity of my conveyor to 300 tons per hour. The actual results, however, during the 1937 navigation season were far beyond my fondest hopes. Our loadings rose to 382 tons per hour.

In the autumn of 1937, together with a group of Kiev stevedores, I was sent to study at the Leningrad Water Transport Academy. The daytime I devoted to study, but at night I worked out the details of a plan for bringing loadings up to 500 tons per hour.

In the spring of 1938 I was in Dniepropetrovsk. Last year's record established by my brigade had already been topped by another brigade—their loadings being 392 tons. I decided to give a hand to the brigade that was lagging most behind. In a short while this brigade, which had always shown the poorest results, was loading 435 tons, beating the records set by the best brigades. A few days later my plan of 500 tons per hour became a reality—in one hour my brigade loaded 504 tons of coal.

The very next day another brigade also topped the 500 mark, loading 500 tons of salt. But soon this high level was left behind. My brigade began loading 630 tons per hour. In other words we were fulfilling 20 normal loading quotas. The conveyor was moving at the rate of 11.4 feet per second. Other brigades were also showing good results.

By the end of 1938 even this high level had been surpassed. Our loadings were now 1,059 tons of coal an hour. In 1939 I have pledged myself to bring up the coal loading on the existing equipment to 2,000 tons an hour.

Every port, every wharf has its own Stakhanovites, its own inventors, its own rationalizers. The names of Petrash and Henkin, Stakhanovite stevedore men from the port of Odessa, are familiar all over the Soviet Union. At the present moment Petrash has been promoted to superintendent of one of the largest ports in the country—the port of Baku. Henkin, who is a foreman stevedore, was elected a member of the Supreme Soviet of the U.S.S.R.

Captain Tchadayev, master of the *Stepan Razin*, was the first to begin towing larger caravans of barges. His vessel began tow-

ing barges loaded with 40,000 tons of oil. Captain Kalmykov increased the number of barges attached to his tug boat to 22 units. In every basin of the Soviet Union people began to emulate the example set by Captains Tchadayev and Kalmykov. They are raising the productivity of labour to unprecedented heights, showing real feats of labour heroism. Many of them have been awarded the highest distinctions in the Soviet Union for their outstanding work.

Women too hold an honourable place in the water transport system. Ann Schetina, captain of an ocean going vessel, Olga Dobychina, pilot, are but two in a whole list of names known all over the country.

The progress made by the water transport system is accompanied by an improvement in the well-being of the water transport workers. This applies not only to wages but also to the cultural level of the transport workers. The following figures give an idea of how average wages have increased.

Average Annual Wages of Water Transport Workers (in rubles).

		1932	1937
River-going vessels:	crew	1,332	3,461
	longshoremen ...	1,825	3,763
Sea-going vessels:	crew	2,341	5,678
	longshoremen ...	1,739	3,934

Two-thirds of all the workers in the ship-building and repairing yards are on a seven-hour shift. The rest are on an eight-hour shift, with the exception of stokers, boilermen and all categories of hazardous trades, who are on a six-hour shift.

Clubs, libraries, theatres, moving picture theatres, stadiums, sports grounds and yacht clubs are at the disposal of the transport workers and their families. The Water Transport Workers' Union has splendid rest homes and sanatoria in some of the most beautiful spots in the Crimea and the Caucasus. These annually accommodate some 50,000 people.

Before the Revolution the water transport system could boast of only 12 second-rate hospitals. By the middle of 1937, 127 hospitals, 270 clinics and dispensaries, 268 first aid stations (located directly in the yards, wharves, etc.), 247 feldsher stations, 42 health centres for children were at the service of the water transport workers.

While the adults are busy at work loading, manning, building or repairing vessels their children are looked after in 400 kindergartens. The best of everything is ensured to the children, who are under the constant observation of trained nurses and doctors and experienced pedagogues. In the spacious rooms and playgrounds of these kindergartens the children find interesting pastimes in collective games, music, singing and drawing. In the summer time the kindergartens leave for the countryside.

Under the Third Five-Year Plan (1938-42) the water transport system will play a still more important role in the economic life of the Soviet Union. The fleet of river and sea vessels will be considerably improved from the technical standpoint and will be supplemented by new and still better vessels. The plan provides for the construction of new ship-building yards. The freight turnover of river transport is planned at 36,000,000,000 ton-miles for 1942 and that of sea transport at 32,000,000,000 ton-miles.

New water arteries are to be opened during this Five-Year Plan period and these will increase the length of the inland waterways from 63,342 miles (the total length at the beginning of 1938) to 76,015 miles.

Of the Volga projects the Uglich development and Rybinsk development will begin to function during this period, while the year 1942 will see the completion of the Rybinsk and Uglich reservoirs. This will increase the depth of the river between Rybinsk and Ivankovo from 4 feet to 16.5 feet. At Kuibyshev work is under way on the largest hydraulic engineering scheme in the world—two hydro-electric power plants of an aggregate capacity of

3,400,000 kilowatts. The dams here will raise the level of the river for a stretch of 1,242 miles and this will allow the passage of ocean-going vessels, provide cheap power to factories and works along the Volga, the South Urals and Moscow, besides irrigating 7,410,000 acres of arid land.

The general plan for the reconstruction of the water arteries of the U.S.S.R. provides for the construction of eight hydraulic engineering development schemes on the Volga River alone, including the three now under construction. Preliminary work has already begun on the Kama River development scheme near Solikamsk, in the Urals, one of the four projects that will be built on this river. Powerful hydraulic engineering projects will also be built on another tributary of the Volga—the River Oka. A canal at Stalingrad will link up the Volga and the Don rivers. This will give the Volga an outlet to the open sea, connecting it with the Sea of Azov and the Black Sea. With the completion of the Volga-Don Canal, Moscow will become a port of five seas.

The reconstruction of the Volga-Baltic waterway will also be undertaken during this period and will transform this route into a deep watercourse linking up the Volga with the White Sea and the Baltic Sea.

The Kama-Pechora-Vychegda watercourse will link the Volga with the river of the North giving it an outlet to the Arctic.

By the end of the Third Five-Year Plan period the Northern Sea route from Murmansk to Vladivostok will function as a normal route ensuring regular scheduled shipments to and from the Far East.

The Soviet merchant marine, furnished with new, first-class vessels, will ensure still cheaper and quicker shipment of raw materials for the needs of industry, agricultural produce, manufactured goods and consumers' goods produced by Soviet works and mills, along the waterways of the U.S.S.R.

THE MOSCOW-VOLGA CANAL

By A. Komarovsky

ENGINEER. ORDER OF LENIN.

ON the bank of what once was a small stream called Khimki, just a few miles outside of Moscow, towers a magnificent structure built of granite and marble. From a distance it looks like a giant double-decker ocean liner with a structure reminiscent of a captain's bridge in the middle. A five-pointed gold star glistens at the top of its tall spire of stainless steel, rising 262 feet above the ground.

The main entrance to the building is decorated with porcelain discs bearing sculptured representations of the Kremlin, the Palace of Soviets, the Lenin Mausoleum, the Theatre of the Red Army and the Dnieper Hydroelectric Station. The porcelain discs on the land side depict a number of famous ships, such as the ice-breaker *Krassin*, the Soviet cruiser *Aurora*, Columbus' caravel, etc.

A broad granite staircase leads down to a concrete pier. The waves of the newly-created wide Khimki Lake lap the stone moorings.

This building is known as Moscow's Northern River Port. Its façade ought to bear the inscription:

"Moscow's Port of three Seas:

The White, Baltic and Caspian."

The history of the canal which links the Moscow River with the Upper Volga dates back two hundred years.

In the 1720's Emperor Peter I commissioned engineer William Henning to design the plans for a canal between the Volga and the Moscow River. The plan called for the building of 100 locks with a water-level of not more than $6\frac{1}{2}$ feet each. The canal was to be navigable for vessels with a deadweight of about 50 tons. A trip along the projected canal was to take at least three days.

Fairly detailed plans were drawn up. But the task of cutting that kind of canal seemed too complicated and unrealizable in those times. The project was pigeonholed and the question of the canal was not broached again for another hundred years.

The idea of building a Moscow-Volga canal was resuscitated in the 19th century during the reign of Nicholas I in connection with the decision to erect the Cathedral of Christ the Saviour in Moscow. At that time the building of a cathedral of the size planned seemed to be a colossal undertaking, and the transportation of the necessary building material presented a practically insuperable problem. After interminable meetings of committees and sub-committees it was decided to dig a canal between Moscow and the Volga for the sole purpose of transporting limestone and granite from the upper reaches of the Volga to the construction site of the cathedral.

A project was drawn up for a canal between the Sestra River, a tributary of the Dubna which flows into the Volga, and the Istra River, a tributary of the Moscow River.

Work on this canal went on for 19 years. In the meantime the building of a railway between Moscow and St. Petersburg (now Leningrad) was begun, and economists pointed out that the clients who were expected to use the artificial waterway would prefer to send their shipments by the new railway. The work on the canal was accordingly discontinued and all its structures, finished and unfinished, were sold at public auctions. The idea of the canal was again consigned to oblivion for another century.

It was only in recent years, in the Socialist state of workers and peasants, that the idea of linking the Volga with the Moscow River was realized on the initiative of Joseph Stalin.

The realization of this idea faced the engineers with a difficult problem. The Volga whose waters had to be made to flow into the Moscow River was separated from the latter by 80 miles of

fields, marshes and hills. The task was to create a navigable waterway across the high divide between the two rivers.

The Soviet engineers in charge of the project displayed great ingenuity in solving this problem.

They built a number of large earth dams and created a chain of artificial lakes joined with each other by means of canals and a system of locks rising in the form of "water stairways" from each side of the new waterway—from the Volga and from the Moscow River.

In order to provide an uninterrupted supply of water for the new waterway, a large storage lake, known as the "Sea of Moscow," was created at the Volga terminus of the canal. This lake holds 39,547,200,000 cubic feet of water and regularly discharges 3,530 cubic feet of water per second which is conveyed by the canal to Moscow. Two hundred major engineering structures have been erected along the route of the canal, including 11 reinforced concrete locks 950 feet long and 98.4 feet wide each, 3 reinforced concrete and 11 earth dams, 7 railroad and 12 highway bridges, 5 pumping stations, 8 hydro-electric stations with an annual output of 150,000,000 k.w.h., and the Stalin waterworks.

In order to make the waters of the Volga flow into the Moscow River, it was necessary to excavate approximately 262,000,000 cu. yards of earth and pour about 7,000,000 tons of concrete. The building of the canal required 850,000 tons of cement, 9,156,000 cu. yards of stone and gravel and 110,000,000 bricks.

This tremendous job was performed in record time. The entire construction took 4 years and 8 months. This could be accomplished only by having the work mechanized. The numerous machines which were used in the construction of the canal were all produced in Soviet factories.

The special railroads, which served the construction site, were provided with 160 locomotives, 225 motor railcars and 2,100 flat cars.

The builders of the canal further had at their disposal 275 tractors and 3,050 trucks, 190 hydraulic giants and 170 steam shovels were working in the excavations and quarries.

Telephone and telegraph wires of a total length of 2,740 miles stretched like a dense cobweb overhead along the entire route of the future canal. The construction was provided with 3,200 telephones and 22 telegraph stations.

The Moscow-Volga Canal was finished in the summer of 1937, on the day fixed for its completion.

On May 2, 1937, a flotilla of large motorships and cutters, the first to pass through the Canal, cast anchor opposite the walls of the ancient Kremlin.

In the navigation season, ships running exactly on schedule leave the pier at Moscow's Northern Port on Lake Khimki and proceed northward.

The ships follow the canal, rising to the watershed and then descending again.

Small rivers flowed here but a few years ago. Now these rivers no longer exist. Huge earth dams were built across the channels of the streams. The latter flooded their natural valleys and formed artificial lakes covering a total area of over 23 square miles. Sections of the canal connect the separate storage lakes, and the vessel pursuing its course over the new waterway passes through the connecting canals, with their geometrically precise stone banks, from lake to lake, each abounding in small green islets and bays.

The Moscow-Volga Canal is 79.5 miles long. It is 18 feet deep, which is an unusual depth for river canals. Its width—280.4 feet—is sufficient to allow the simultaneous two-way passage of the largest river vessels. Big three-decker passenger ships and heavy metal barges with a deadweight of 18,000 tons can sail on the Canal.

Looking at the green meadows, woods and pastures on the

shores of the artificial lakes and observing the flocks of ducks rising noisily from under the very nose of the ship, or the grey gulls circling and screeching overhead, one might think that these lakes, bays and creeks have been created by nature and have existed here since time immemorial. Only the stone banks of the canal and the arched bridges spanning it bear witness to the fact that this waterway is the handiwork of man.

One of the artificial lakes is the Ucha Reservoir. Its southeastern section is protected on three sides by earth dams. The reservoir holds 7,944,750,000 cu. feet of water. Here the silt and mud settles and the clear water then flows south through a special reinforced concrete channel about 17 miles long to the Stalin Waterworks where it is further purified before it passes into the pipes of Moscow's water distribution system.

The last lake in the series of steps by which the canal rises to the crest of the watershed is bounded by an earth dam. Next to the dam rise the austere and magnificent white stone towers of Lock No. 6.

After passing through the gates of this lock the north-bound vessel begins its descent of 125 feet down the steps of the northern slope of the Canal leading to the "Sea of Moscow" on the Volga. The descent is down a flight of five steps, each of a height of from 19.6 to 26.2 feet. The length of each of these steps, while varying, is measured in terms of miles.

The architecture of the structures along the route of the Canal is also worth noting. Until recently very little attention was paid to the architectural aspect of hydro-technical works. Hydraulic engineers maintained that a lock, for instance, was primarily an engineering structure and its appearance was entirely subordinated to technical requirements. In their opinion every attempt at architectural designing would only tend to obscure the clear and precise purpose of the various structures. They cited the examples of the Suez, Panama and Kiel Canals, where all the structures are

devoid of any architectual embellishment.

The builders of the Moscow-Volga Canal were of different opinion. They held the view that each lock must have its own architecture, and that all the structures of the finished canal must be so architecturally designed as to serve as a fitting monument that would tell future generations of the heroic work of the tens of thousands of workers engaged in its construction.

The Soviet architects attained splendid results in coping with the difficult problem. The lofty towers rising above Lock No. 6 are an example in point.

The lock itself is an immense ferro-concrete chamber 950 feet long and 98.4 feet wide. It lowers the vessel 26.2 feet down the first step of the northern descent. At each of the five steps of the descent the lock is rounded by an auxiliary canal with a pumping station in the centre.

The pumping station at Lock No. 6 is a magnificent tall building faced with natural stone of a light hue. Inside, it is equipped with four propeller pumps which have no equals anywhere in the world

Each pump weighs 85 tons. The diameter of its turning wheel is 8.2 feet. The capacity of its motor is equal to that of the engine of a passenger locomotive. The pipe by which the water is brought to the pump is so wide that a heavy truck could pass through it easily. Each pump raises 5,400 gallons of water per second to a height of 26.2 feet.

As the ship proceeds northward it passes through other locks. Around each lock one sees flowers, young trees, signal lights. Only the lock towers in each case are of a different shape, of a different appearance and different colour.

At last, having descended all the steps of the northern slope, the ship enters the "Sea of Moscow." The contours of the shores are veiled in a misty haze. One catches the sound of a distant ship's siren. It is echoed by the sirens of other ships.

From the "Sea of Moscow" vessels sail in different directions. Some proceed west—to Kalinin. Others take the course southward—to the Canal and then on to the Moscow River, Oka, Volga and the Caspian Sea. Boats sail from here eastward to proceed along the old channel of the Volga to the Mariinsk system leading to Lake Onega and further west to Leningrad and the Baltic or north to the White Sea along the Stalin White Sea-Baltic Canal.

This last route—from the Sea of Moscow to the old channel of the Volga—can be clearly seen from the ship. There is a broad canal leading east from the lake. In the distance rise the white stone towers of a lock which affords passage to the ships proceeding from the "Sea of Moscow" down to the Volga.

To the right may be seen the earth dam blocking the old channel of the Volga. Next to it is the concrete building of the Ivankovo hydro-electric stations with 30,000 kilowatt capacity. (A similar hydro-electric station stands at the beginning of the steps of the southern descent from the divide to the Moscow River.)

Immediately behind the Ivankovo hydro-electric station rises the wall of a concrete dam across the Volga, raising the level of the river 59 feet. A giant crane moves back and forth on top of the dam, raising and lowering the powerful metal shields which block the eastward course of the Volga.

An earth levee extending for 5.5 miles from the concrete dam bounds the "Sea of Moscow" in the east.

And rising above the dams, locks, the hydro-electric station, the expanses of the "Sea of Moscow" and the vessels plying its waters there stand at the entrance to the Canal two colossal monuments—the statues of Lenin and Stalin hewn in grey granite.

A few years ago the Volga flowed here. Each spring it rose in angry floods inundating the adjoining meadows. Each summer its level dropped, and shoals and sandbanks appeared on the surface. In the hot summer months even small vessels with a low draft could not sail in the upper reaches of the Volga.

This place has now been turned into the "Sea of Moscow"—a broad lake covering an area of 126 sq: miles. It is here that the pumping stations obtain the water for the new waterway. It is from here that water is conveyed to the water mains of the capital.

Vessels ply the waters of the wide lake, signalling each other with their sirens. The distant shores echo the signals. In the night the route across the lake is indicated by automatic signal lights.

The ship proceeds westward. There is not a single shoal or sandbank on the way. A broad expanse of water covers the former meadows and brushwood. The waves of the new lake swell over the site where some villages and the small town of Korchev stood only a few years ago—the villages and the town have been moved to new places.

After having traversed a distance of 74.4 miles from the Volga Dam, the ship is moored at the new snow-white landing pier of the port of Kalinin.

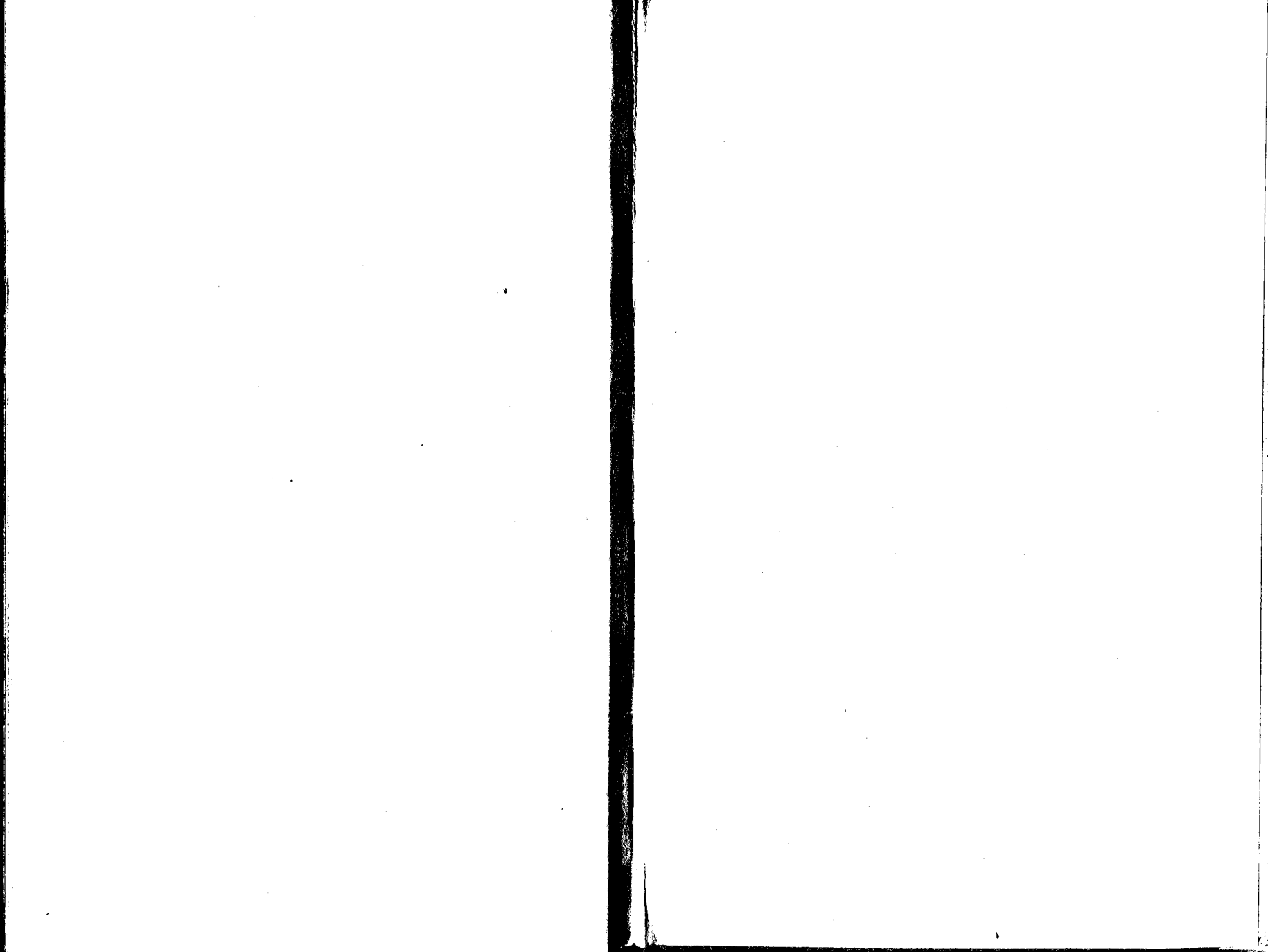
This terminates the trip.

With the cutting of the canal, the waters of the Volga have begun to flow to Moscow. The capital is now fully provided with drinking water.

The waters of the Volga have replenished the Moscow River. As a result the water level of the old Moscow River at the Kremlin has risen almost ten feet. The Moscow has become a deep river navigable for big ships.

The canal has shortened the distance between Moscow and a number of other cities of the Soviet Union. Thus the distance to Gorky has been reduced by 68 miles. The distance from Moscow to Leningrad by water has been shortened by 685 miles.

At the initiative of the great Stalin, the city of Moscow, which was formerly far removed from "big water," has thus been transformed into a port of three seas: the White Sea, the Baltic, and the Caspian Sea.



POSITION OF THE U.S.S.R. IN WORLD PRODUCTION

	GRAIN	1 st
	AGRI. MACHINERY	1 st
	BET SUGAR	1 st
	TRACTORS	1 st
	GOLD	2 nd
	IRON ORE	2 nd
	MACHINES	2 nd
	FREIGHT CARS	2 nd
	ELECTRICITY	3 rd
	S. PHOSPHATE	3 rd
	STEEL	3 rd
	COAL	4 th