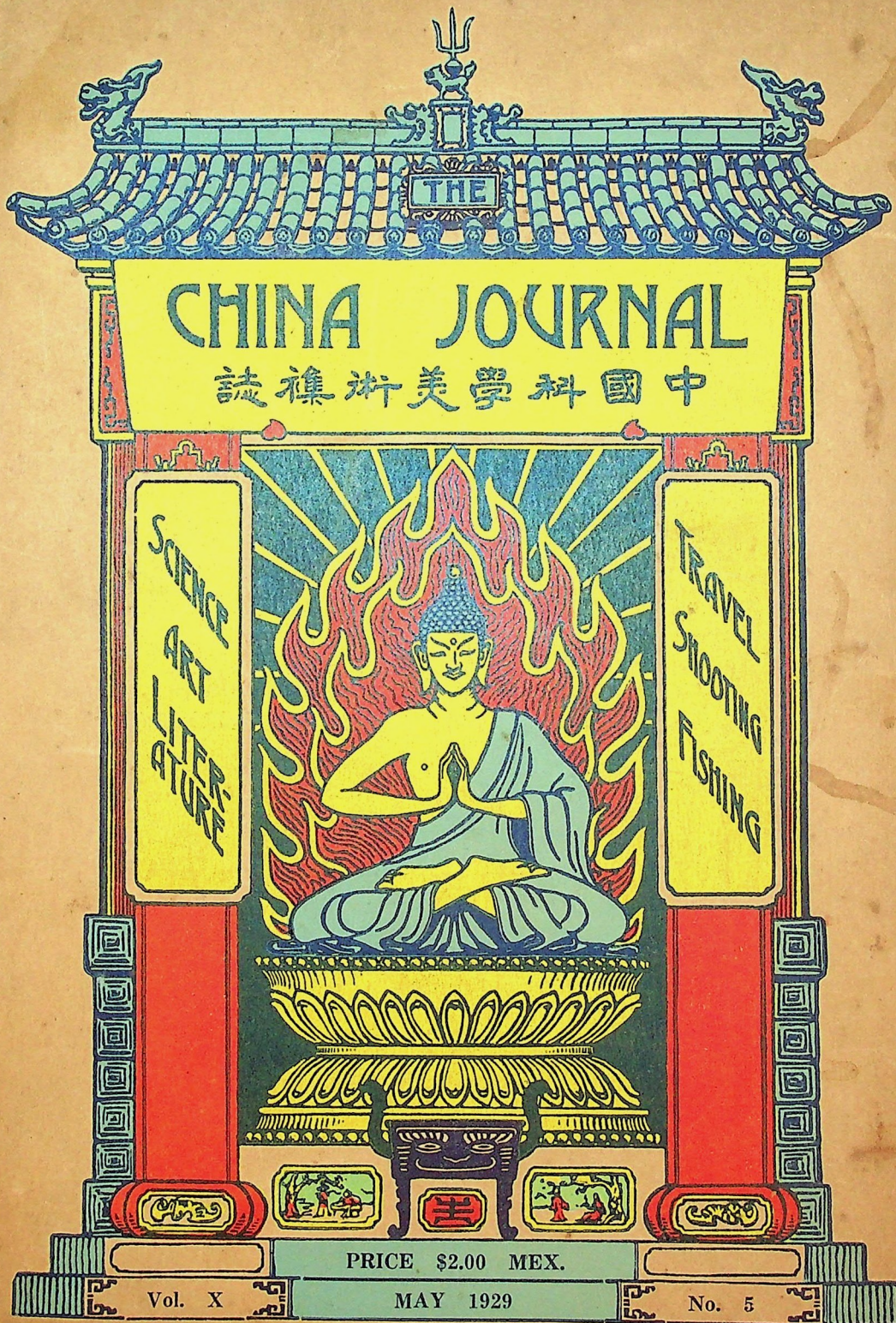

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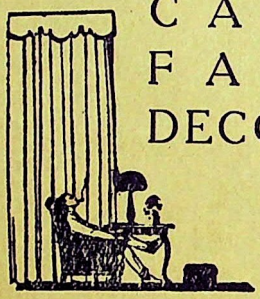

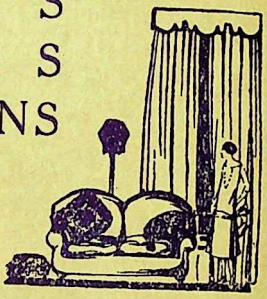

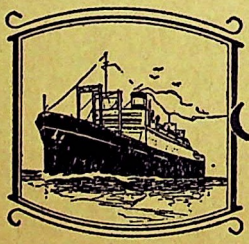

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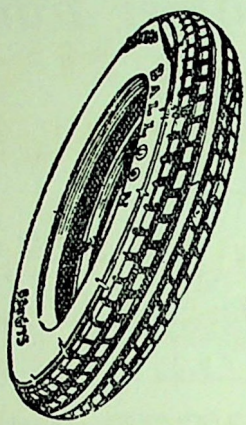

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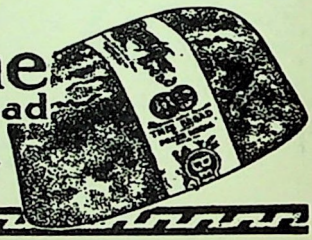

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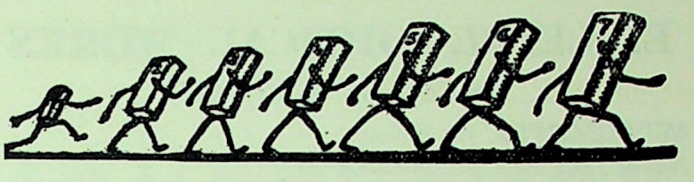

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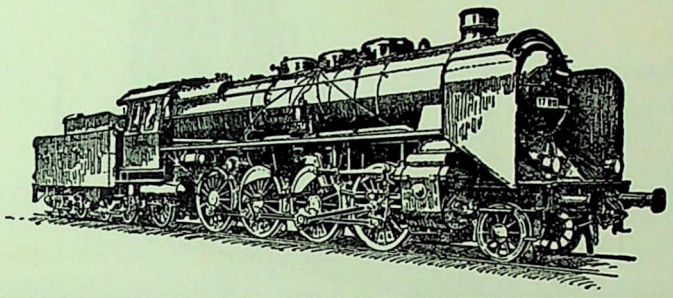

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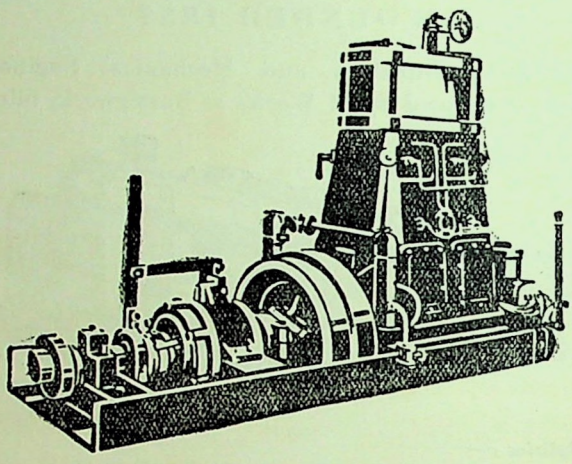

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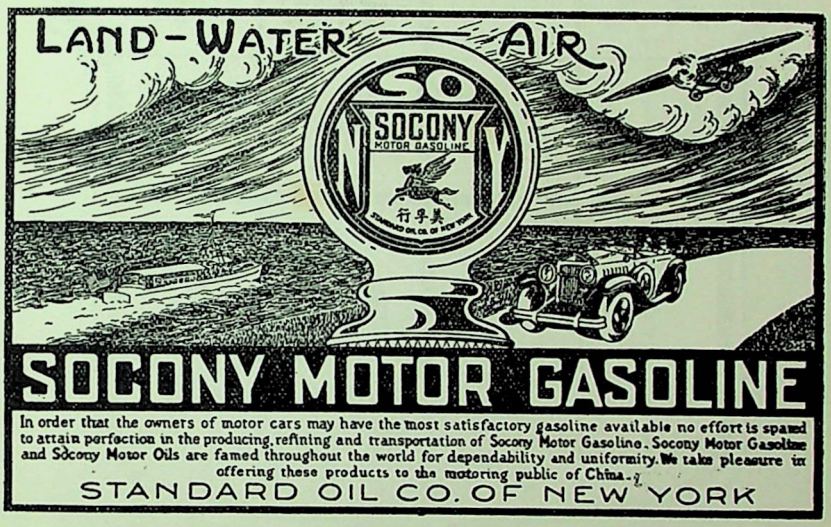
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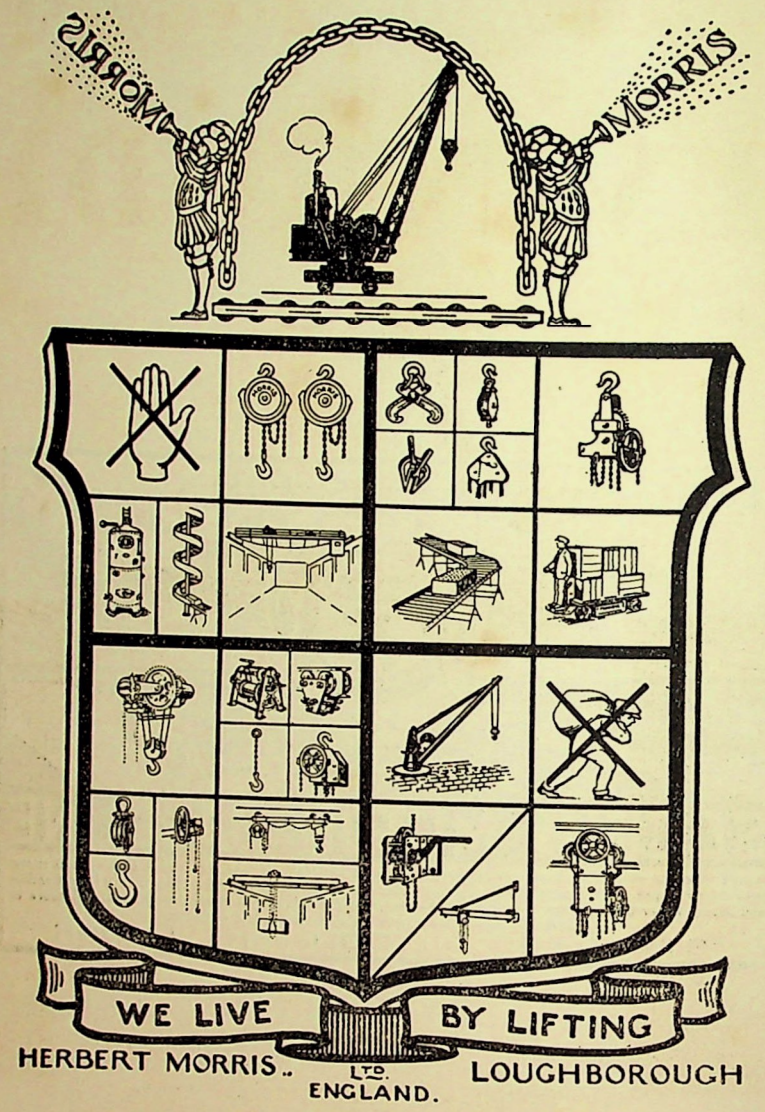

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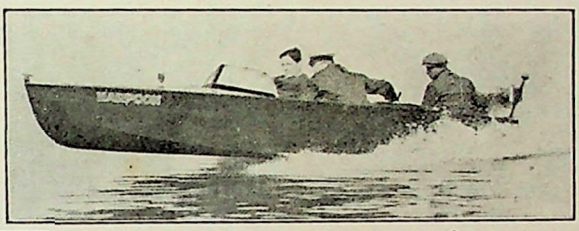

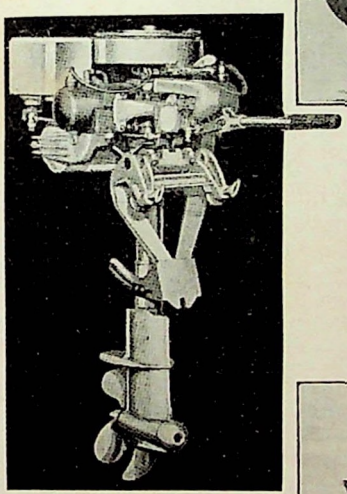

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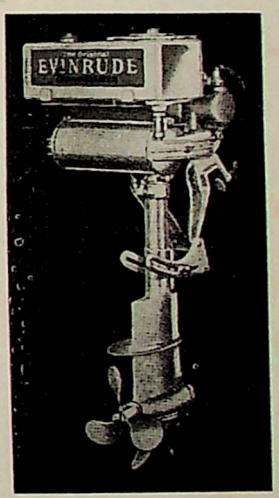



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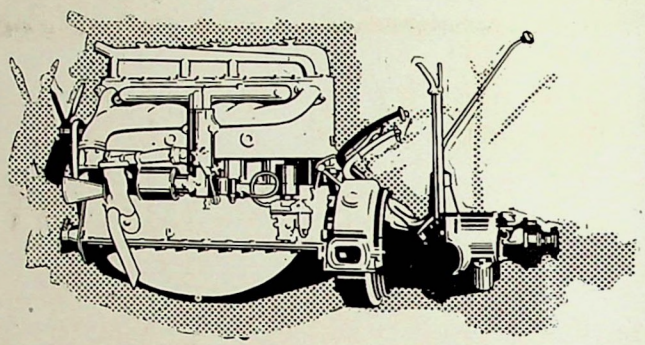

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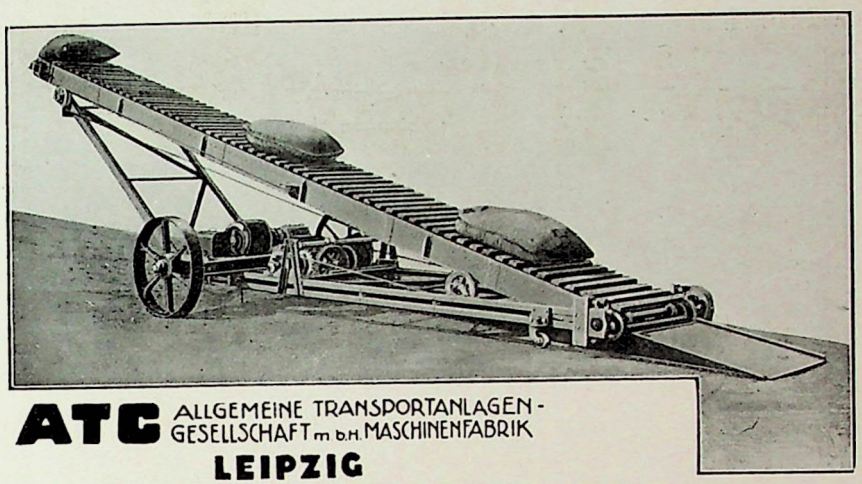

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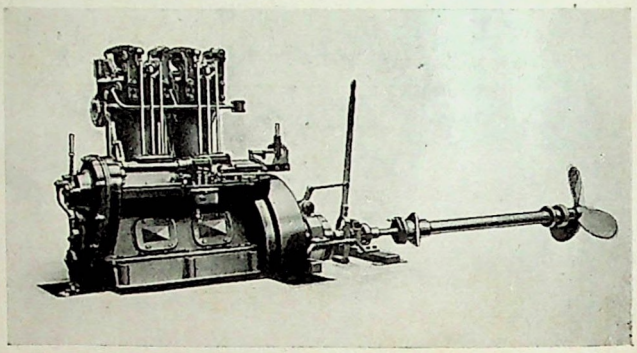

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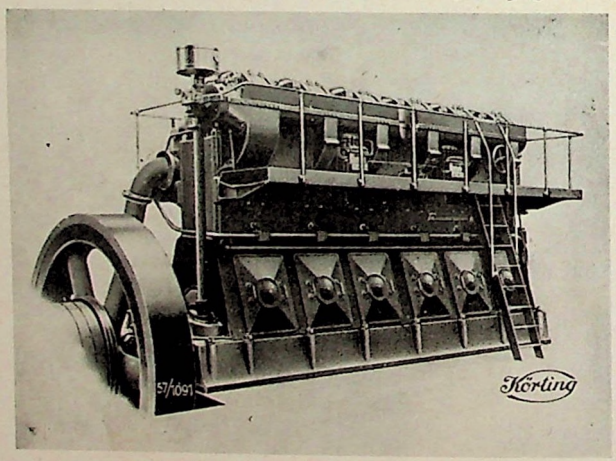

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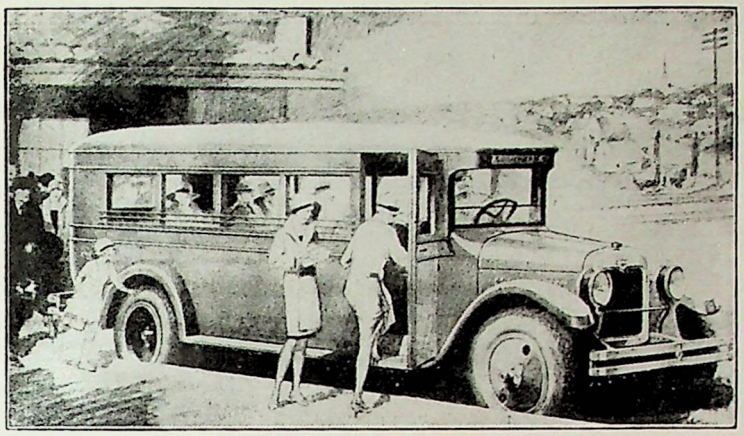

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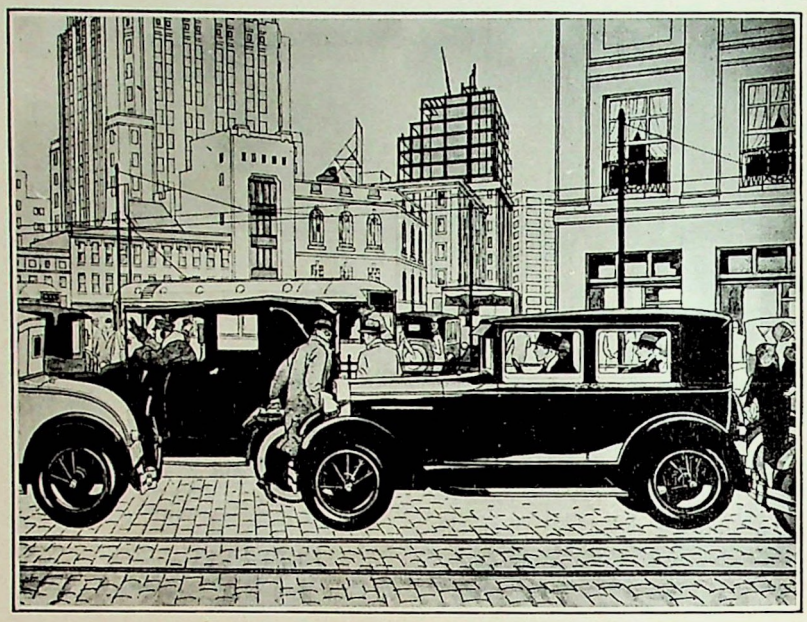

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A great tire, whose quality is indicated by its 11 Big Features listed below—each a definite contribution to your need of Safety, Braking, Steering, Speed, Durability and Economy in the exacting demand of the driving conditions of the day.

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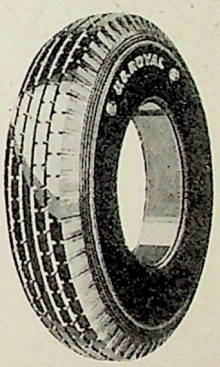
2 Easier Riding
3 Sturdier Construction
4 Easier Steering
5 Freer Rolling
6 Firmer Side Grip



7 Surer Braking
8 Quicker Getaway
9 Smarter Style
10 Best Riding Foundation
11 Six Plies Extra Heavy Web Cord

AND now—here is some more News for you! The same scientific research that produced this New U.S. Royal has not stopped with the production of this one tire.

The New Royal (extra heavy) is merely the *first* of a brilliant series of productions in United States Tires—the first of a complete new advanced line.

Later there will come other new types of U.S. Tires—each individual—each designed for some specific need. The right individual tire for every man individually, every type of car, kind of road and condition of driving.

These new achievements, each in its proper time, will be put at your service through your United States Tire Dealer. Watch for them. They are going to be the Big Tire News of 1929.

United States Rubber Company
Trade Mark

The NEW

U.S. ROYAL

"EXTRA HEAVY"

THE TIRE OF TODAY FOR THE CAR OF TODAY

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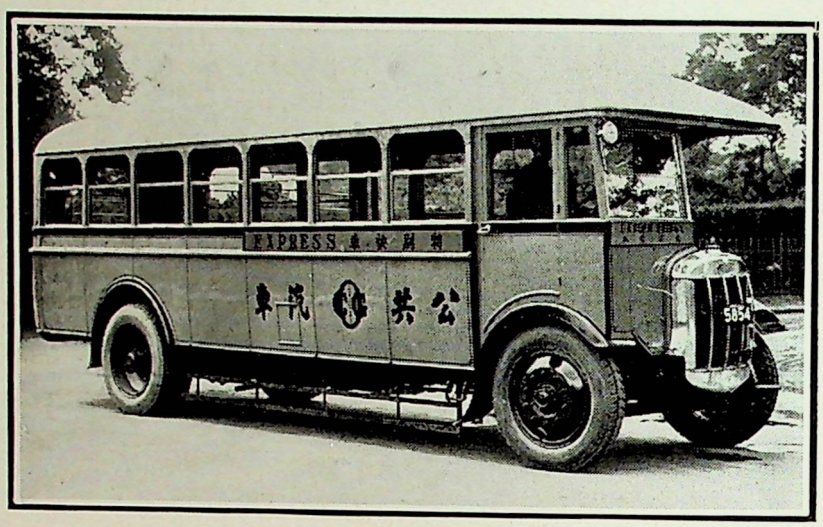

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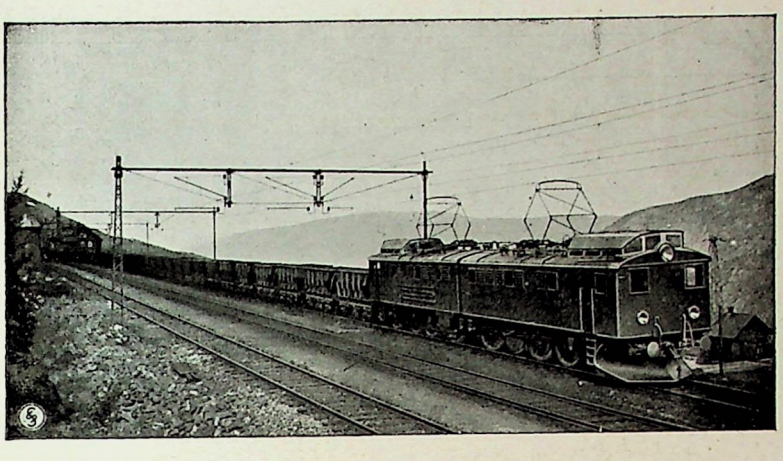

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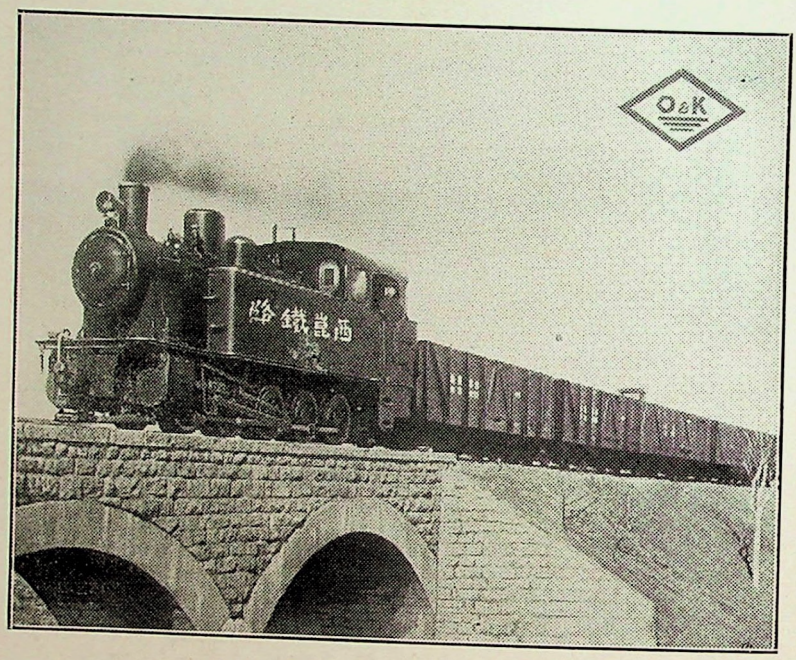

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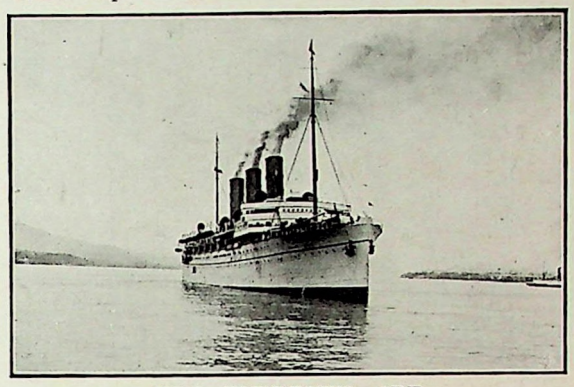

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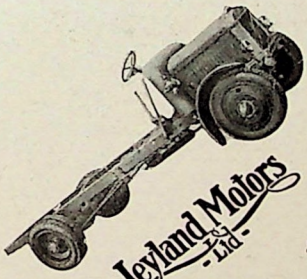

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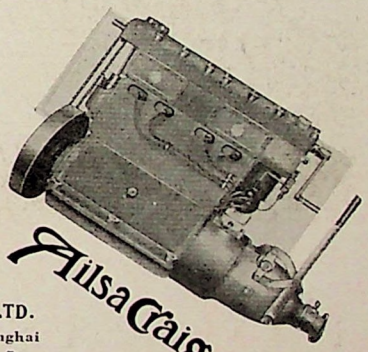

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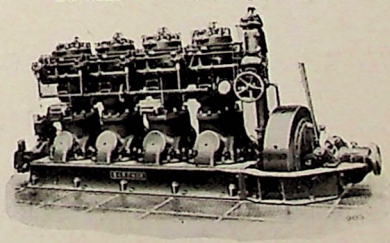

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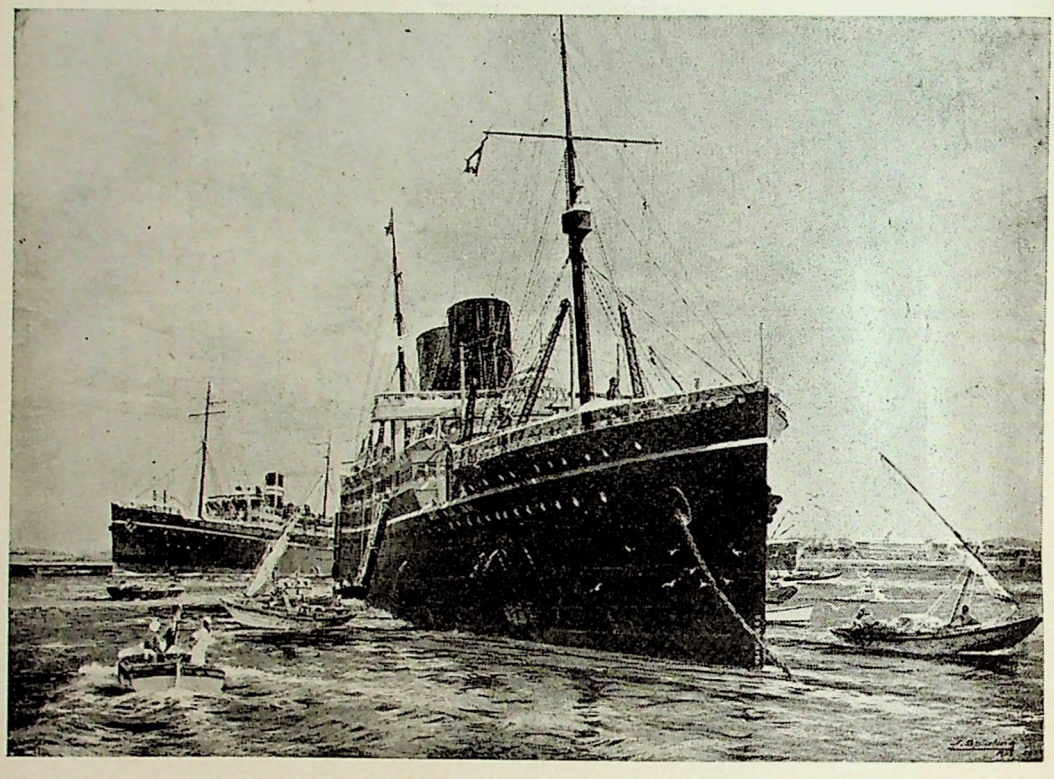

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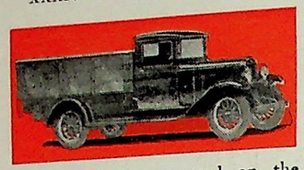
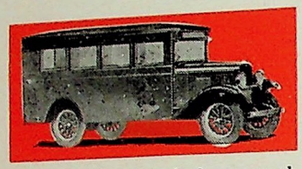


A truck body mounted on the New Chevrolet 1½-ton Utility Chassis



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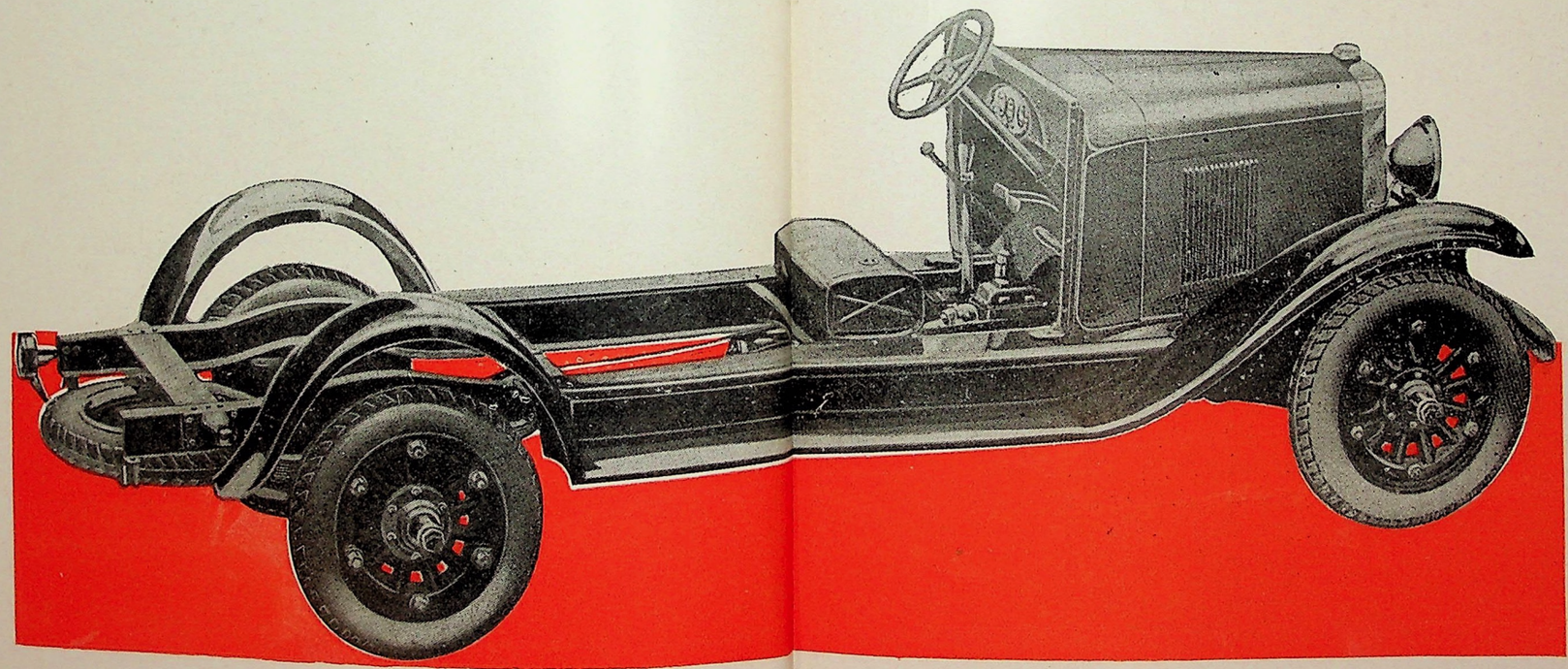

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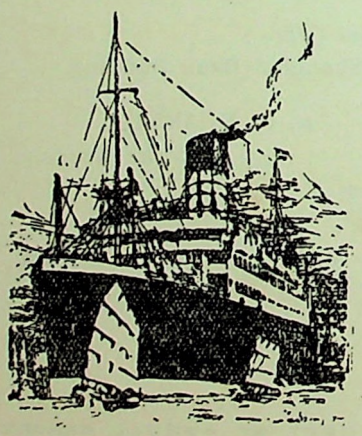

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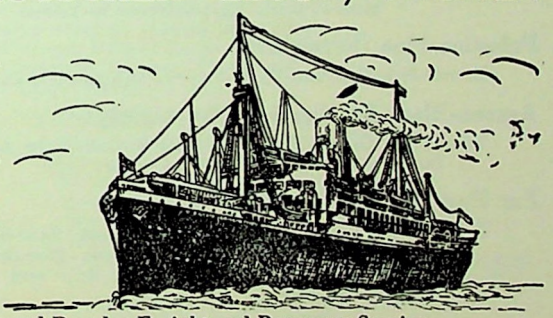

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Westkuste Zentral-Amerikas und Mexico	Punta Arenas, Corinto, Amapala, Acajutla, San Jose de Guatemala, Champerico
Puerto Rico, Haiti, Santiago de Cuba, San Domingo	San Juan de Puerto Rico, Kingston, Santiago de Cuba, Port au Prince, Cap Haitien, Puerto Plata, San Pedro de Macoris, Santo Domingo, Jacmel, Aux Cayes
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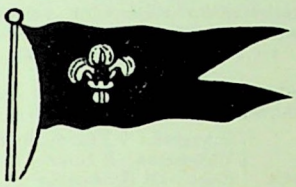

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CONTENTS

		PAGE
CHINA'S TRANSPORT PROBLEM ..	BY ARTHUR DE C. SOWERBY	217
WATER TRANSPORT IN CHINA	BY DR. H. CHATLEY	219
ECONOMICS OF TRANSPORTATION FOR CHINA	BY DR. J. A. L. WADDELL	222
TRANSPORTATION IN EARLY CHINA ..	BY J. C. FERGUSON	227
TRANSPORT IN CHINESE ART		230
CHINA'S TRANSPORT WORKERS, MEN AND BEASTS	BY ARTHUR DE C. SOWERBY	233
THE JUNKS, SAMPANS AND INLAND WATERWAYS OF CHINA	BY ARTHUR DE C. SOWERBY	243
TRANSPORTATION ON THE YANGTZE KIANG	BY H. FOOTE CAREY	248
HARBOURS AND CONSERVANCY WORK IN CHINA		255
THE MOTOR ROADS OF CHINA		258
THE RAILWAY IN CHINA		261
MOTOR TRANSPORT IN CHINA		267
AVIATION IN CHINA	BY CAPTAIN V. J. B. HOLLAND	271
THE HISTORY OF AVIATION IN CHINA		273
CHINA'S OVERSEAS, COASTAL AND RIVERINE SHIPPING		275
TRANSPORTATION NOTES		280

Contributions of a suitable nature are invited and all manuscripts not accepted for publication will be returned.

Books for review should be sent to the Editor as early as possible.

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Classified Index of Advertisers

ART AND CURIO DEALERS:
Jade Store IX
Toyo Murakami III

AUCTIONEERS, ETC.:
Shanghai Auction Room, The IV

BANKS:
National City Bank of New York VI

BOOKS, BOOKSELLERS AND AGENTS, ETC.:
Naturalist in Manchuria, The XCI
Oxford University Press .. LVI

BUILDING MATERIALS:
Crittall Manufacturing Co. (Metal Windows) XII
Kailan Mining Administration LIV
Wilkinson, Heywood and Clark X

CHEMICAL IMPORTERS, DRUGGISTS, ETC.:
China Export, Import and Bank Co. (Bayer Aspirin).. IV
Eno's Fruit Salt LXI
Imperial Chemical Industries (China), Ltd. LV
Llewellyn & Co., J. (Curex).. XII
National Aniline and Chemical Co., U.S.A. (Dyestuffs) .. LXXII
Schmidt & Co. VIII

ELECTRICAL ENGINEERS AND CONTRACTORS:
Electric Service Corporation LXXIX
Hugo Reiss & Co. Federal Inc. (Westinghouse) .. .. Cover 3
Western Electric LXXXI

ENGINEERS, MACHINERY MERCHANTS, SHIPBUILDERS, ETC.:
A. E. G. China Electric Co. .. XI
American Trading Co. (Lifts) LXXXIV
Arnhold & Company Limited LIII
Behn, Meyer China Co., Ltd. (Roadbuilding Accessories) LXXX
China United Engineering Corporation XI
Eastern Engineering Works, Ltd. XXXVII
Ekman Foreign Agencies, Ltd. (SKF) LXXXIX
Gordon & Co., Ltd. LII
Inniss & Riddle (China), Ltd. XVI
Jebsen & Co. (Bosch) .. LXXVII
Jensen, G. S. (Bolinder's Engines) LXXX
Jensen, G. S. (Portable Pilers) XXIII
Kunst & Albers (Junkers) .. XIV
Mee-Yeh Handels Compagnie XIII
Middleton & Co., Ltd. (Priestman Grab Dredger) .. LXXXVIII
Mitsui Bussan Kaisha .. LXIV
Oliveira & Son, H. .. LXXXVII
Priestman Bros, Ltd. (Grab Dredger) LXXXVIII
Siemens China Co. (United Steel Works Corp.) .. XXIX
Siemssen & Co. (Orenstein and Koppel A.G.) XXX
Wallem & Co... XLIII

FOOD PRODUCTS:
Allen & Hanbury (Allenbury's Milk Food) I
Bianchi's IX
Cafe Federal LX
McBain, George, Import Department (Rouyer Guillett & Co., Brandy) LIII
James Neil's Scotch Bakery (Bermaline Bread) .. IV
Shanghai Ice and Cold Storage Co. (Clover Brand Butter) IX

FOUNTAIN PENS:
Parker Duofold, Jr. (Dodge and Seymour) LXII

FURNITURE MANUFACTURERS:
Arts & Crafts, Ltd. .. .. Cover 2

HOTELS:
Hongkong & Shanghai Hotels, Ltd. LIV

IMPORTERS AND EXPORTERS:
Arnhold & Co. LIII
Gmehling & Co., G (Les Parfums de Mury) .. LXX
Golding & Co , Wm. (Kotex) LXVIII
Harrison, King and Irwin, Ltd. LXVII
Malcolm & Co. .. .. Cover 3
Mitsui Bussan Kaisha .. LXIV
Moeblus, W. O. LXV
Rondon & Co., Ltd., L. (Coty) LXXI
Whitsons, Ltd. X

INSURANCE COMPANIES:
Cornhill Insurance Co., Ltd... XXXVII
Cumine & Co., Ltd. XXXVII
Essig Emile (The Baloise) .. XXXVIII
Gibb, Livingston & Co., Ltd. XLIV
Jardine, Matheson & Co. .. XLVI
Manufacturers Life Insurance Co. XXXIX

JEWELLERS:
China Jewellery Co., The .. XII
Jade Store IX

KODAKS:
Eastman Kodak Co... .. LXIX

MERCHANTS AND COMMISSION AGENTS:
Burkill & Sons, A. R. .. XL
Wattie & Co., Ltd., J. A. .. LVII
Whitsons, Ltd. X

MOTORS:
Dodwell & Co., Ltd. (Leyland, Ailsa and Gardner) .. XXXI
Jensen, G. S. (Bolinder's Crude Oil Engines) .. LXXX
Seidel, A. C. (Korting Four Cycle Diesel Motors) .. XXIV

MOTOR BOATS:
Hambleton China Company (Evinrude) XVII

MOTOR CARS AND ACCESSORIES:
Andersen, Meyer & Co., Ltd. (International Motor Trucks) XXV
Auto Palace (Overland Whippet) LXXXIII
Bosch (Sparking Plug) .. LXXVII
Ford Motor Company Exports Inc. (Fordor Sedan) .. XXVI

(Continued on next page).

Classified Index of Advertisers *(Contd.)*

Enssle, K. XII
General Motors (Buick) .. XVIII
General Motors (Chevrolet & G.M.C. Trucks) XXI
General Motors (Chevrolet Trucks) XXXIV
General Motors (Chevrolet Trucks) XXXV
Jebsen & Co. (Bosch) .. LXXVII
Jensen, G. S. (Bilo) XXII
Kunst and Albers (Stewart Trucks) LXXVIII
Overland Motors, Ltd. (Whippet) LXXXIII
Standard Products Co., Fed. Inc. U.S.A. XIX
Thornycroft & Co., John I. .. LXXIII
Union Motors (Nash) .. LXXVI
Weeks & Co., Ltd. (Bus Bodies) XXVIII

MOTOR CAR TYRES:

China Rubber Tyre Co., Ltd. (Firestone Tyres) LXXV
Dunlop II
Goodyear LXXIV
Ilbert & Co., Ltd. (Firestone Tyres) LXXV
United States Rubber Co. (U.S. Royal Tyres) .. XXVII

OIL COMPANIES:

Asiatic Petroleum Co. (North China) Ltd. XCI
Asiatic Petroleum Co (North China) Ltd. (Shell Oil) .. LXXXII
Standard Oil Co. of New York XLIII
Standard Oil Co. of New York XV

OPTICAL GOODS, ETC.:

American Drug Co. (Microscopes) LVI
Carlowitz & Co. XC
Schmidt & Co. VIII

PHOTOGRAPHY:

Agfa Photo-Materials .. VII
Carson Studio.. LX
Eastman Kodak Company .. LXIX

PUBLISHERS, PRINTERS, NEWSPAPERS, ETC.:

Discovery LVI
North China Daily News & Herald, Ltd. (China Architects and Builders Compendium) LVIII
Oxford University Press .. LVI
Tientsin Press, Ltd. (P. & T. Times) LX
Tientsin Press, Ltd. (The Naturalist in Manchuria) .. XCI

REAL ESTATE AGENTS:

Shanghai Land Investment Company VI

RUBBER ESTATES AND RUBBER PRODUCTS:

Bulkill & Sons, A. R... .. XL
Wattie & Co., Ltd. J. A. .. LVII

SCIENTIFIC INSTRUMENTS:

American Drug Co. (Microscopes) LVI

SILKS LACES, EMBROIDERIES AND SHAWLS:

Courtaulds, Limited .. .. Cover 4
Wai Tzun Silk Co. LXIII

STEAMSHIP, RAILWAY, TRAM, BUS AND TAXI COMPANIES:

American Mail Line .. Cover 2
Anglo-Danish Shipping Co. .. XLII
Canadian Pacific Steamships, Limited XXXI
China General Omnibus Co., Limited XX
Compagnie Francaise de Tramways et d'Eclairage Electriques de Shanghai .. LXXXV
Dairen Kisen Kaisha .. XLIII
Dollar Steamship Line .. Cover 2
Eisler, Reeves & Murphy, Inc. (Marine Surveyors) .. XC
Ekman Foreign Agencies, Ltd. (Swedish East-Asiatic Co., Ltd.) LXXXIX
Ellerman and Bucknall S. S. Co., Limited XL
Ford Hire Service XXXVIII
Furness (Far East), Ltd. .. LI
Hamburg-Amerika Linie .. L
Indo-China Steam Nav. Co., Ltd. XLIX
Jardine, Matheson & Co., Ltd. XLVII
Jardine, Matheson & Co., Ltd. XLIX
Kailan Mining Administration XLV
Lacey & Cannan, Ltd. .. XL
Lloyd Triestino N. Co. .. XLVIII
MacKinnon, Mackenzie & Co. Cover 3
Marden (Transportation) .. XCII
Messageries Maritimes .. LII
Mitsui Bussan Kaisha .. LXIV
Nordeustscher Lloyd, Bremen XLVII
P. & O XXXII
Prince Line LI
Rickmers Linie XLVI
Shanghai Electric Construction Co., Ltd. (Trams) .. LXXXVI
Shanghai Tug & Lighter Co., Ltd. XLII
States Steamship Company .. XLVI
Swedish East-Asiatic Co., Ltd. LXXXIX
Taylor Garage LXXVII
Wheelock & Co. XLII
Yangtsze Rapid Steamship Company, Federal Incorporated U. S. A. XLI
Yellow Taxicab of China .. LXXXI

STEEL WORKS:

Davie, Boag & Co., Ltd. .. LXXII
Eagle & Globe Steel Co. .. LXVI
Moebius, W. O. LXV
Osborn & Co., Ltd., Samuel .. LXV
Ward, Ltd., Thos. W. .. LXVI

TAILORS, GENTLEMEN'S:

Gray & Co., C. N. LXVII

TOBACCO:

Alhambra Cigars LIX
Ardath Tobacco Co., Ltd. (State Express 555) .. XXXIII
British-American Tobacco Co. (China) Ltd. (Capstan Cigarettes) V

TRAVEL AGENCIES:

Hawaiian Tourist Bureau .. LXII

TYPEWRITERS:

Dodwell & Co., Ltd. (Underwood Portable) I

WINE MERCHANTS:

Egal & Cie X
McBain, George, Import Dept. (Rouyer Guillett & Co. Brandy) LIII
Raphael, R. K. LVI

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THE CHINA JOURNAL
中國科學美術雜誌

VOL. X MAY 1929 No. 5

CHINA'S TRANSPORT PROBLEM

BY

ARTHUR DE C. SOWERBY

Transportation is to a country what the circulatory system is to an individual body. Roads and waterways form the arteries and the means of transport form the blood. Just as the functions of the blood are to carry food supplies, oxygen and other necessities of life and health from those parts of the body where they are taken in and prepared for use to those where they are needed, and to carry away waste products and deposit them where they can be expelled from the system, so the chief tasks of the various agencies of transport in a country are to carry food and other supplies from the ports of entry or the factories to the consumers, and to carry away refuse.

If the circulatory system of a living body is in good order and functioning properly, the whole body is in a healthy condition ; but if for any reason it breaks down and does not function properly, the whole body very soon feels the effect and a state of ill-health ensues. So with a country : the inefficient working or disruption of its system of internal communications very soon upsets the well-being of that country as a whole, tending to produce a state of disorder and chaos that is analogous to illness in an individual.

For this reason the very life of a state or a community depends upon its system of transportation and internal communications, which, therefore, must be considered by far the most important part of its whole organization.

China is no exception to this rule. An enormous country with a huge population, she contains immense areas that are not readily accessible from seaports or by rivers, and must therefore be reached by overland

methods of transport. Unfortunately for the country, the chaos that has been produced by the civil wars and banditry of the past few years has resulted in a very extensive breaking down of her system of internal communications, and many of the interior areas not accessible by water have become practically isolated. Famine has followed as a natural sequence, and its horrors are accentuated by the fact that it is almost impossible to send food to the stricken areas owing to the lack of adequate transport. The distant province of Kansu constitutes one such area. On the one hand, while people are dying by the thousand and cannibalism is rampant, on the other the normal means of communication have become so disrupted as a result of military activities that neither food nor money can be despatched to the sufferers with any certainty of reaching them. Kansu is not alone in this condition. Considerable areas in Shensi and North Shansi are similarly affected ; and, if matters go on as they are, it will not be long before other extensive areas in China will come to the same pass.

Even in more favoured areas considerable distress is being felt by the merchant and artisan classes owing to the wholesale interruption of inter-provincial trade and the extreme difficulty that is being experienced in getting goods and merchandise to interior districts from the seaports, and *vice versa.*

Indeed, so bad has been the interruption to normal trade conditions, and for so long a period, that even with the cessation of hostilities and the suppression of banditry a very considerable period would necessarily elapse before pre-civil war conditions could be restored with the old methods of transport.

Those who have studied the situation and conditions most carefully realize that there are two things China needs more than anything else to set her on the road to peace and prosperity. These are honesty and integrity amongst her rulers and official classes, and a good and up-to-date system of internal communications. It lies with the Chinese people to supply the former, since no one but themselves can help them in this ; but with regard to the latter a great deal can be and is being done from outside to put this country on her feet.

For millenniums the Chinese have been content with a system of roads and waterways and methods of transport that, while excellent in their time and day, have now become, or are fast becoming, obsolete.

Throughout the world machinery is rapidly taking the place of human and animal labour. The emancipation of the labouring classes demands the substitution of the motor-lorry for the wheelbarrow, the motor-car for the rickshaw, the railway engine and wagons for the mule-cart and pack train and the steam-launch and motor-boat for the *sampan* and junk.

In the last issue of this journal we had occasion to dwell upon what has picturesquely been called China's wheelbarrow civilization by one of the country's foremost thinkers of the day. Let there be no misunderstanding our attitude in this : we are not in any way indulging in carping criticisms in discussing the present position of this great country with regard to modern economic developments. On the contrary, we have

called attention to the present state of affairs merely with a view to arousing interest in the subject and paving the way to what has long been in our mind, the devotion of a complete issue of this journal to the subject of transport in China in all its phases, past, present and future, with the ultimate object of contributing our quota to the great and laudable task of placing this country on a sound economic basis.

We believe that what will be found in the following pages will prove not only of interest to our readers, but of value to all who are in any way connected with transport in this country. We have been fortunate in securing the assistance of experts in writing up the various phases of our subject, and we are confident that the information here offered is both up-to-date and accurate.

Our subscribers will, we feel sure, excuse the ommission of certain regular features of this journal from this issue, such as art, scientific, educational and other notes and reviews, the kennel and garden sections and reports of the meetings of societies: these will appear in our next issue, the June or special summer number.

WATER TRANSPORT IN CHINA

BY

HERBERT CHATLEY, D.Sc. (Engineering), M.Inst. C.E.

Two essential features of civilization are the association of men in co-operating groups and the sub-division of labour. Hence we find that in the hunting stage there are small mobile camps; in the nomad pastoral stage there are large mobile camps; in the agricultural stage there are numerous small fixed villages with field paths; in the agricultural-commercial stage there is a system of villages, towns and cities, connected by roads and rivers; and in the modern condition with international relations there is a complex of villages, towns, cities and ports, connected by roads, railways, rivers, canals and ocean routes. In each case the "centres" are places for the redistribution and reconstruction of bartered goods. The modern state forms a living group in which all the individuals are more or less co-ordinated. The farmers supply all the others with the surplus production of food and raw organic materials, and they in exchange provide the farmers with their surplus of manufactured goods or enable the farmers to forward agricultural products to remoter individuals, with whom a similar exchange is made. There is thus a steady flow of goods to and from the various centres, and as civilization advances the volume of flow increases. Every aid to easier inter-communication benefits both producer and consumer. As H. G. Wells showed nearly thirty years ago in his book "Anticipations," there is a close relation

between the methods of transport and the spacing of the group centres. Villages are situated within convenient walking distance of fields worked by the residents. A country town is located within one day's convenient access of the group of villages which surrounds it. The larger centres are determined by geographical and political conditions, but the number and spacing is also dependent on the economics of transport and distribution. The easy and continuous flow of commodities is thus an essential factor in the vitality of a civilisation, and improvements in communications have tremendous influence on the wealth of a country. The steam locomotive in the last century entirely transformed the activities of Europe and America, and the motor-car is now creating another similar drastic change. The steamship similarly has transformed international commerce, and aviation is beginning to produce analogous results. Back of all these is the economic factor. The new methods of transportation (excepting aviation) are cheaper than the old ones, and therefore enable *more* goods to be exchanged over the same distances, or the same goods to be exchanged over *greater* distances, and in both cases *more rapidly*, thus saving labour. In the growth of China, starting from the first nucleus in Western Honan, the reclamation of the marshland from the migrating rivers played a very large part, and in this connection the superiority of water transport over land transport on natural routes early become apparent. As a result we find that the whole of the plains of China are traversed by navigation routes, which are in most cases tremendously more effective than the land routes. In modern times the railroad (and to a very small extent in China the motor road) has competed with water routes, but it is only where the water routes are naturally poor or the appliances are antiquated that the railroad or motor routes successfully rival the water routes of similar length. Thus the Grand Canal has been much more affected by ocean transport than by the Tientsin-Pukow Railway.

The reason for this superiority of the water route is not far to seek. The resistance to motion in water is minute compared with that of the best land transport except at high speeds, and diminishes per unit weight of cargo with the size of the fully-loaded ship. For short journeys the question of extra handling to and from the ship, together with the delay of the ship during loading or discharge, enters into the question, but for long journeys the differences are enormous. Ocean transport is particularly economical.

Transport in small cargo boats in the neighbourhood of Shanghai may be less than three Mexican dollar cents per ton mile, and can be reduced appreciably below this with larger vessels and long hauls.

Ocean transport may be as little as half a Mexican dollar cent per ton mile for long journeys.

Motor truck transport works out at about 15 Mexican dollar cents per ton mile, but is dearer than hand cartage for very short routes.

Rail transport in China is rarely less than one Mexican dollar cent per ton mile.

Wheelbarrow transport may be as high as twenty or more Mexican dollar cents per ton mile.

Camel and bearer transport is still more expensive.

These figures are all very approximate, as in each case the handling charges and the length of transport affect the figures in contrary ways. It will, however, be seen that motor transport cannot in general compete at all with water transport unless the water route is very much longer or there are some special conditions (such as urgency in regard to perishable goods). Rail transport can and does compete successfully with inefficient water transport, and has the further advantage of speed (reducing wages per mile and causing other indirect economic benefits), but it cannot compete with good water transport on moderately large vessels.

There is hence a saving in water transport which may be partially anticipated and warrants expenditure on improvements. Improvement of water transport may take two forms :

(*a*) Improvement of the waterway by mechanical dredging or controlling the currents so that they wash out obstructions.

(*b*) Improvement of the vessels.

The first is a matter for careful study, and in some instances is very advantageous, but in others the costs involved are so enormous that they would exceed the anticipated savings.

The second is chiefly a matter of size. Mechanical propulsion is generally cheaper than wind power, provided that cheap fuel is accessible, because of its certainty, superior average speed and controllability.

Very high speeds are not economical, since the resistance to the motion of a ship varies as the square of the speed, but the saving in wages per mile due to speed does make a very fair speed economical.

The resistance to a ship depends on the wetted surface area, so that for similar proportions it varies as the *square* of the dimensions, but the cargo-carrying capacity varies as the *cube* of the dimensions, so that the resistance per ton of cargo diminishes with the size of the ship. This is the reason why ocean transport in large full ships is so cheap, and indicates that, other things being the same, the largest possible ships, with the greatest draughts that the channels will permit, are preferable.

There are many factors to consider in regard to the future development of transport in China, but the above general ideas show clearly why every effort should be made to improve the water routes within economical limits and to enlarge the ships which use them.

The services for irrigation and drainage of the various water courses are frequently reconcilable with improvements for navigation. The development of water power (which is usually only economical in the upper reaches of a river) is generally unfavourable to both navigation and flood control, by reason of obstruction of the dams, but in some cases by means of locks navigation may be aided.

There are few countries in the world where the natural and artificial water-courses provide such possibilities for water transport as China does, and all those who have the *Min Sheng* at heart should endeavour to get the maximum use of those possibilities.

ECONOMICS OF TRANSPORTATION FOR CHINA*

BY

DR. J. A. L. WADDELL

Transportation for China may be divided into four primary groups, listed in the order of their importance as follows :

A. Water
B. Railway
C. Highway
D. Aerial

Waterways are more important than either railways or highways in that they are Nature's means of communication and because they cost generally but little for upkeep. They have also the economic advantage that steamboats carry more freight than railroads per unit of fuel expended. On the other hand, the streams, lakes and harbours in the northern portions of the country freeze in winter and thus block entirely transportation over them by boats. For this reason in cold districts it would not do to rely upon them solely ; hence it would be necessary to supplement them by railways or highways or, preferably, both.

Railways and waterways should be made to supplement each other ; and they should not be considered as rivals, for the latter should carry the bulky freight in places where they compete, leaving for the railroads the transportation of most of the passengers, light and perishable freight, express and mail.

Where rivers freeze, the bulky freight, such as grain, with proper prevision can generally be shipped by water between harvest time and the date when the waterways become ice-bound ; and that date in many important locations can be postponed somewhat by the employment of ice-breakers for keeping the channels and harbours open.

In America, where people are always in a hurry for everything, river and canal navigation has not received the attention that its importance deserves ; but the government there is beginning to awaken to a knowledge of the economic value of water carriage, for the construction of several great waterways is now being seriously contemplated.

In China, on the contrary, the waterways have always been the principal means of travel and freight transportation ; and immense sums of money have, very properly, been spent on bank protection and the building of canals.

I said at the outset that railways and waterways should not be considered as rivals ; but there is one place where they cannot help being such, namely, where they cross each other without tunnelling. In

* No. 2, of A Series of Memoirs entitled "Some Thoughts Concerning Economics in the Development of China."

America the river transportation interests often either oppose strenuously any proposed crossing of an important waterway by a bridge, or make such demands concerning its layout as to render its construction almost prohibitory. The railroads, on the other hand, feel that they, too, have some rights ; and they fight for them vigorously. The arbiter in such disputes is the U. S. Engineer Corps, an organization of the War Department. It apparently has a tendency to favour the waterways side of disputes, perhaps because the maintenance of waterways is one of its regular duties. The consequence is that the railway companies and the promoters of toll-bridges, or the communities where highway bridges are needed, are forced to pay for their structures more than they can well afford—sometimes they are even prevented entirely from building. There is a happy mean, of course, and it should invariably be adopted by the arbiter when settling disputes concerning such river or harbour crossings. The bridge should not be allowed to interfere seriously with navigation, block prejudicially the passage of the water or affect adversely the regimen of the stream by causing scour of banks or shifting of the navigable channel. But arbitrary or unjust demands on the part of the shipping interests should be ignored, not only in the interests of justice but also because they militate against national progress.

This question of river crossings by railways and highways will arise some day in China, hence it is pertinent to discuss here the possible pros and cons of both sides of the controversy. The navigation interests may demand tunnelling, as that method of crossing does not interfere with them at all ; but as tunnelling is almost always more expensive than bridging, the railway people would object strenuously and the highway authorities even more vigorously. Not only is a tunnel expensive to build, but sometimes it is costly to maintain ; and it is always disagreeable to its users, who do not care to go below ground any sooner than Nature compels them to.

If the navigation interests do not demand a tunnel, they may insist upon a high-level bridge and one with an unreasonably long span or long spans. Both the owners and the users of the structure would object to this, first, because of the large initial cost, and, second, because of the high climb, which would involve both loss of time and much expense.

The railway or highway people, as the case may be, will generally offer a low level bridge with as short spans as they think the deciding authority will accept ; and the navigation interests will probably fight this proposal " from the word go "—possibly with good reason. They will say that the proposed structure would be a menace to navigation on account of the restricted channel and the danger of a vessel that is out of control running into a span and seriously damaging both itself and the structure. There is a good deal of sense in this claim, but it is not of enough importance to warrant compulsion of the railway or highway to climb to an abnormal height. The best compromise is to adhere to a low-level structure having its vertical clearance sufficiently great to permit small river craft to go beneath the fixed spans, and giving enough height at the movable span to pass, without any possibility of interference, the tallest-masted vessels that navigate the waters to be

ECONOMICS OF TRANSPORTATION FOR CHINA*

BY

DR. J. A. L. WADDELL

Transportation for China may be divided into four primary groups, listed in the order of their importance as follows :

A. Water
B. Railway
C. Highway
D. Aerial

Waterways are more important than either railways or highways in that they are Nature's means of communication and because they cost generally but little for upkeep. They have also the economic advantage that steamboats carry more freight than railroads per unit of fuel expended. On the other hand, the streams, lakes and harbours in the northern portions of the country freeze in winter and thus block entirely transportation over them by boats. For this reason in cold districts it would not do to rely upon them solely ; hence it would be necessary to supplement them by railways or highways or, preferably, both.

Railways and waterways should be made to supplement each other ; and they should not be considered as rivals, for the latter should carry the bulky freight in places where they compete, leaving for the railroads the transportation of most of the passengers, light and perishable freight, express and mail.

Where rivers freeze, the bulky freight, such as grain, with proper prevision can generally be shipped by water between harvest time and the date when the waterways become ice-bound ; and that date in many important locations can be postponed somewhat by the employment of ice-breakers for keeping the channels and harbours open.

In America, where people are always in a hurry for everything, river and canal navigation has not received the attention that its importance deserves ; but the government there is beginning to awaken to a knowledge of the economic value of water carriage, for the construction of several great waterways is now being seriously contemplated.

In China, on the contrary, the waterways have always been the principal means of travel and freight transportation ; and immense sums of money have, very properly, been spent on bank protection and the building of canals.

I said at the outset that railways and waterways should not be considered as rivals ; but there is one place where they cannot help being such, namely, where they cross each other without tunnelling. In

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* No. 2, of A Series of Memoirs entitled " Some Thoughts Concerning Economics in the Development of China."

America the river transportation interests often either oppose strenuously any proposed crossing of an important waterway by a bridge, or make such demands concerning its layout as to render its construction almost prohibitory. The railroads, on the other hand, feel that they, too, have some rights ; and they fight for them vigorously. The arbiter in such disputes is the U. S. Engineer Corps, an organization of the War Department. It apparently has a tendency to favour the waterways side of disputes, perhaps because the maintenance of waterways is one of its regular duties. The consequence is that the railway companies and the promoters of toll-bridges, or the communities where highway bridges are needed, are forced to pay for their structures more than they can well afford—sometimes they are even prevented entirely from building. There is a happy mean, of course, and it should invariably be adopted by the arbiter when settling disputes concerning such river or harbour crossings. The bridge should not be allowed to interfere seriously with navigation, block prejudicially the passage of the water or affect adversely the regimen of the stream by causing scour of banks or shifting of the navigable channel. But arbitrary or unjust demands on the part of the shipping interests should be ignored, not only in the interests of justice but also because they militate against national progress.

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traversed by the structure. The spans should be long enough to avoid undue interference with the current and injurious scouring of the river banks.

When the building of lorries (generally called motor-trucks in the U.S.A.) and motor-busses was started in North America there was conflict initiated between their owners and those of the railroads they paralleled. In self defence the latter sometimes inaugurated bus lines and motor-truck lines of their own. To-day, however, it is pretty generally recognized that such lines make good feeders for the railways ; but they should run transversely to them and not parallel. For China it would be best to build a few long railroads as main arteries of travel with an occasional cross line of railroad where some distant place of importance is to be reached, and have a sufficient number of highway feeders on each side of the railway to carry the exports and imports of the entire district that the line is intended to serve. It must be remembered that in China railroads are expensive and that macadamized highways are comparatively cheap ; hence the latter should be built as feeders to the former, instead of branch lines of railroad.

In respect to the economics of railway operation in China, much might be said as to details, but space will not permit, hence my following remarks will be confined to the major problems thereof.

A. Shipping in bulk instead of in small parcels or packages is truly economic ; and the railroad management should teach its patrons this axiom. Charges on car-load lots can be made considerably lower than those on small-bulk shipments and still leave a good margin of profit.

B. Return freight should be sought so as to avoid the hauling of empty cars, which practice, on the face of it, is uneconomic.

C. To as great an extent as feasible, trains should be made up of cars destined for the same station, so as to avoid loss of time and money in switching. When coal or ore is shipped over the line there should be trains of cars loaded solely with these freights.

D. High speed of trains, although augmenting the fuel consumption and the wear and tear of rolling stock, will save so much in time as to make it economic ; but, of course, for each kind of train there is one rate of speed that is more economic than any other, and the management should endeavour to adopt it on all occasions. The economic speed is a function of the quality of the fuel ; and an investigation should be made on the economics of the various kinds of coal available.

E. A weak bridge, imperfect track, or any other condition that necessitates the placing of a slow order for trains is uneconomic, in that it increases the time of travel between termini. The cost of operating trains is an inverse function of their average speed (including stops) ; consequently anything that tends to reduce the number or to shorten the lengths of stops, or to prevent the slowing up of trains is conducive to economy.

F. A well maintained track is economic, because it not only permits of high speed but also reduces the wear and tear on the rolling stock.

G. Proper up-keep of locomotives and cars is economic, for the reason that breakdowns thereof cause delays—and delays cost money.

H. A good *esprit de corps* and a fine spirit of loyalty among the railroad employees are conducive to economy, because they militate for increased efficiency and effort, and, consequently, for augmented output and reduced expense.

I. Idleness of employees or any waste of their time is uneconomic. Whenever they run short of useful occupation, the management is at fault and should be brought to task.

As for the economics of the building, operation and maintenance of highways in China, it may be said that, for the present, it would not be economic to adopt any road surfacing that is more expensive than macadam. Of course, concrete or bitulithic pavement would be better, but just now it is beyond the means of this country. The grading can be done inexpensively on account of the cheapness of Chinese labour. Cuts should be avoided, unless so doing would increase the grade beyond the desired limit. The roadbed should be thoroughly rolled with a heavy road roller operated by mechanical power, and the layers of earth when placed in embankments should be limited to about six inches in thickness. The macadam surfacing should be not less than ten (preferably twelve) inches thick, and it should be constructed according to first class specifications—such as those given on page 1837 of my " Bridge Engineering." The width of the macadamized surface should be twenty feet for two lines of vehicles, with ten feet more for each extra line provided for. The drainage, which is the most important feature of either road or railroad building, should receive the utmost consideration and care. This matter is of such extreme importance that one of the memoirs of this series will be devoted entirely to its discussion.

The limiting load for any truck, including its own weight, for a macadamized road in China should be five, or at the very most, six American short tons. No narrow-tired vehicle, excepting only jinrikishas for carrying passengers, should be allowed on the finished road. Of course, up to a certain reasonable limit, the greater the carrying capacity of a motor-truck the greater the economy of operation ; but this presupposes a truly hard-surfaced road. When the wheel load becomes so heavy as to break up the macadam surface or to force it into the supporting soil, the damage done will over-balance the economy of the greater capacity of vehicles.

The same remark applies also, but in a lesser degree, to auto-busses. If these are provided with amply wide tires, the question of their load being too great for the road surface is not likely to arise.

As for the economics of the different kinds of power for highways, I would list them thus :

A. Mechanical power B. Animal power C. Man power

For other places than modern highways, I would list the methods of carriage, from the economic viewpoint, as follows :

A. Horse-drawn
B. Camels
C. Pack horses
D. Jinrikishas
E. Man-pulled carts
F. Wheelbarrows
G. Sedan chairs and dandies
H. Freight-poles for two or more men
I. Back loads for men

On waterways the methods of carriage, arranged in the order of their economics, will generally be found to be as follows :

A. Large steamers
B. Small steamers
C. Motor launches
D. Sailing junks
E. Small boats operated by rowing, poling, or dragging

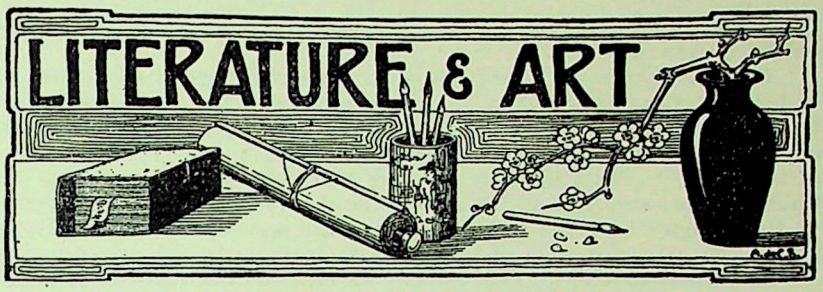
There is some doubt about the correctness of the position on this list of item C; for it is conceivable that under unfavourable conditions, sailing junks or small boats operated by man power might be more economic in freight carrying than motor launches ; but when the latter are large and when there is an ample depth of water to float them, they certainly are superior.

There is a feature of economics in both construction and operation that must not be forgotten, namely, that what may be cheapest for the contractor or the operator may not be best for the nation, because the great mass of the people must be kept employed and fed, even if figures show that such employment is uneconomic. But this point will be treated in a future memoir entitled " Economics of Labour for China."

At first it is probable that the newly constructed highways would be used by horse-drawn wagons and carts, pack animals, jinrikishas, man-pulled carts, sedan chairs, dandies, pole-carriers, and pedestrians ; but the slow-moving wheelbarrows with their heavy loads and comparatively narrow tires should not be allowed upon it, nor should any other narrow-tired vehicles except passenger-carrying jinrikishas. Sooner or later the pack animals and pedestrians (including those carrying sedan chairs, dandies, and poles) would be compelled to use paths adjacent to the road, built along the berms, and the slow-moving carts and, eventually, even the jinrikishas would be displaced by lorries and motor-busses, either for economic reasons or by governmental edict. The proper place for these, and some of the other crude conveyances of freight, to function is the cheap side roads of the country districts that would be needed as feeders for the main highways and their branches.

As for aerial transportation, the time when it will be most needed is the next decade, so as to carry mail, express and occasional passengers to distant points all over the country. After the railroads and highways in any district are in full operation, there will be no such crying need for airplane transportation as there is to-day, hence most of the planes could be moved to more remote districts, leaving only a few for extra-rapid travel of mail and for policing the country.

A well thought out system of aerial transportation should be installed without delay ; for not only would it serve the purposes just mentioned, but also it would enable the Government to quell uprisings and to preserve peace and order throughout the Republic.



TRANSPORTATION IN EARLY CHINA

BY

JOHN C. FERGUSON

The earliest reference in Chinese literature to methods of transportation is in connection with the conservancy scheme of Yü the Great and is found in the Book of History in the first part of the chapter called I Chi. In replying to the question of Kao Yao as to how he accomplished his great work Yü said that he made use of four methods of transportation (四載). These four methods have been explained in the Historical Records (史記) of Ssũ-ma Ch'ien as the use of carts for transportation on land, of boats for water, of sledges for transportation over mud stretches and of hob-nailed boots for carrying over hills.* These two latter objects, namely, sledges and boots, were mentioned only in connection with the special conservancy work of Yü and were not ordinary methods of transportation. The two articles in common use were boats and carts.

Boats

In the Book of Odes (詩經) there are references to boats made of cypress wood, of pine and of willow. There are also two references to bridges made of boats. In the Book of History there is a reference to a boat with oars, *chou chi* (舟楫). The only mention of a boat in the Confucian Analects is in the flattering question of Nan Kung Kuo concerning the ability of an ancient hero to move a boat on land ; and there is no mention of a boat by Mencius. This is easily understood when it is remembered that these two sages lived in Shantung where transportation was wholly on land. The references in the Books of Odes and of History were to be expected, because the people of whom they made mention lived on the banks of the Yellow, Lo and Wei Rivers. There is no suggestion as to the size of these ancient boats or as to their shapes in these classical allusions. They were known as *chou* (舟), the term

* 陸行乘車, 水行乘船, 泥行乘橇, 山行乘檋.

ch'uan (船) not having come into common use in the meaning of a boat until the Han Dynasty.

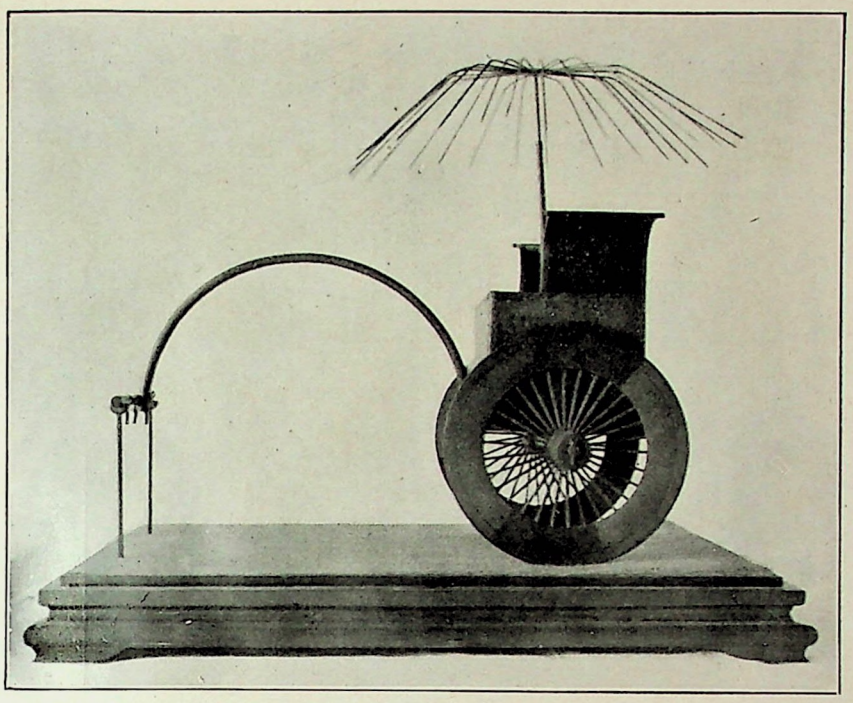
Ship-building must have been in an advanced stage of development in the 3rd Century B. C., when, it is recorded, the Emperor Shih Huang of the Ch'in Dynasty sent three thousand youths and maidens on an expedition over the Gulf of Pechihli in search of "The Three Isles of the Blest." Boats in large numbers also were used in the battle at Ch'ih Pi, the modern Chia Yü Hsien, about fifty miles west of Hankow on the Yangtze River, at the beginning of the period of the Three Kingdoms, 220 A.D. In spite of these known facts as to the use of boats in the earliest periods of Chinese life we have no descriptions of their size or shapes in classical literature and no illustrations of them in ancient archæological or artistic remains. The earliest traces of them are found in landscape painting, where they are first shown as small flat-bottomed, square-ended fishing boats similar to our punts, *hua ch'uan* (筏船).

The earliest illustrations of boats with which I am familiar are contained in the San Ts'ai T'u Hui (三才圖會) written by Wang Ch'i of Shanghai, who lived during the first half of the 16th Century. His illustrations are based, he claims, on those found in earlier books, so that among Chinese scholars the San Ts'ai T'u Hui has a good standing for reliability. This book in Chapter IV introduces the subject of boats by a quotation from the Shih I Chi of the 4th Century A.D., in which it is said that rafts made of poles or bamboos with the ends bent up originated before the time of Huang Ti, the legendary ruler who is stated to have lived in the 26th Century B. C. The earliest type of raft is seen in the accompanying illustration. These developed into many types used for varying purposes. There were official boats called *chan ch'uan* for carrying government officers on official errands. There were many types of fighting boats. The largest were called *kuang ch'uan* (廣船) and the next *fu ch'uan* (福船). These were propelled by oars, had stations in the masts for firing arrows and protected the fighting sailors with shields made of wood, bamboo or leather stretched on wood and reinforced with metal strips or large-headed spikes. There were double-ended boats for steering from both ends and boats with battlements. For use in shallow rapids there were skin boats which were kept in shape by a framework of wood or more often of bamboo. These are said to have been used by Chu-ko Liang for scouting purposes in his southern expedition.

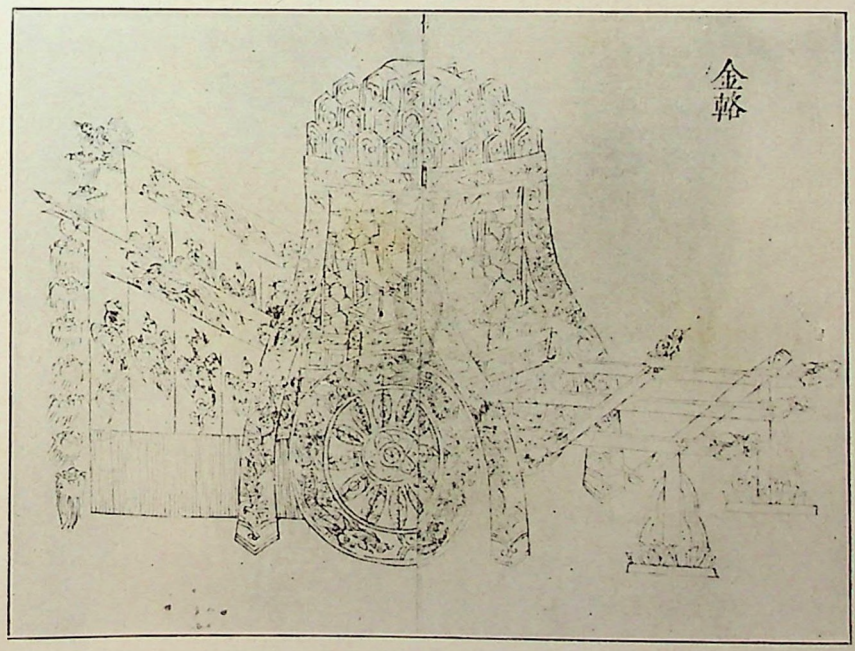
At the present time there is an endless variety of types in the boats used on the coast and in the inland waters of China, and these have been well described and illustrated by Donnelly in his "Chinese Junks and Other Native Craft" (Kelly and Walsh).

Carts

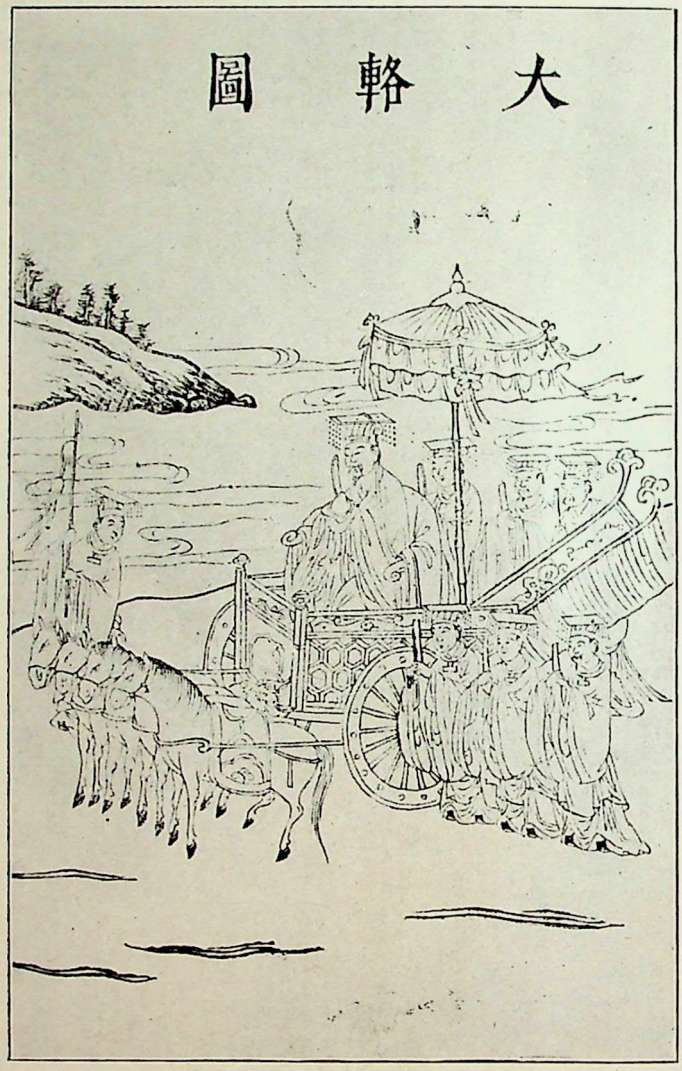
As to carts, we have full descriptions of them in the earliest records. The K'ao Kung Chi section of the Chow Li gives such a detailed description of the size and shapes of ancient carts that it has been possible for the Historical Museum, Peking, to reconstruct a model of one. This is on view in the Museum, and is of great interest (See Illustration). This



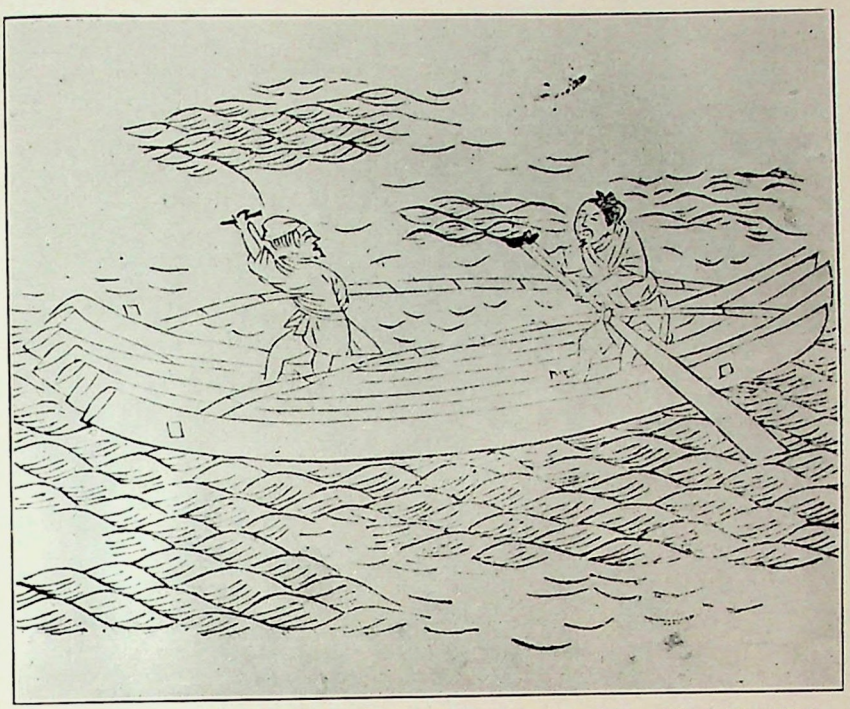
Model of an Ancient Chinese Chariot in the Historical Museum at Peking.



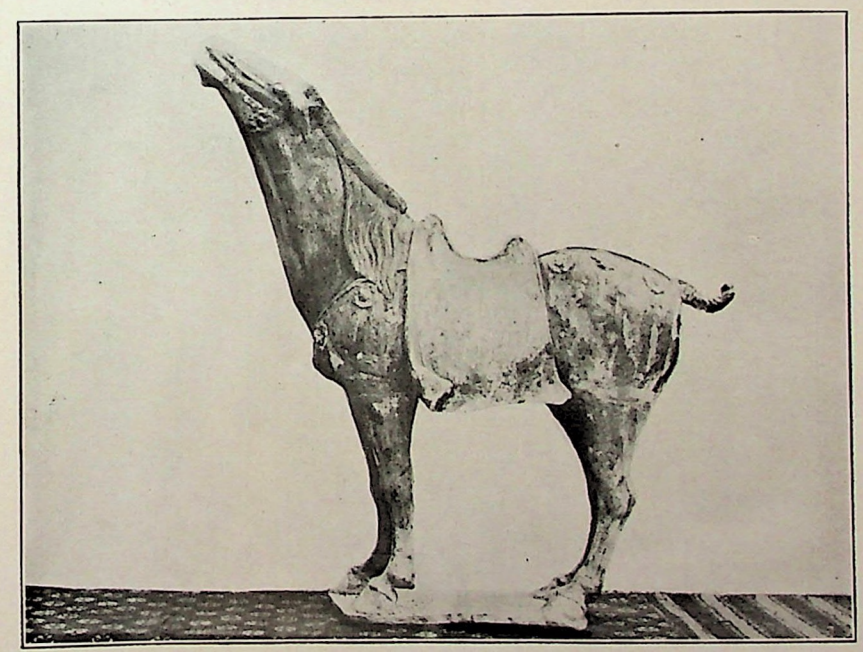
A Drawing of an Ancient State Chariot decorated with Bronze from the San Ts'ai T'u Hui.



A drawing of an Ancient Chariot from the San Ts'ai T'u Hui. Note the four Horses abreast and compare with the Text Figures of Roman Chariots.



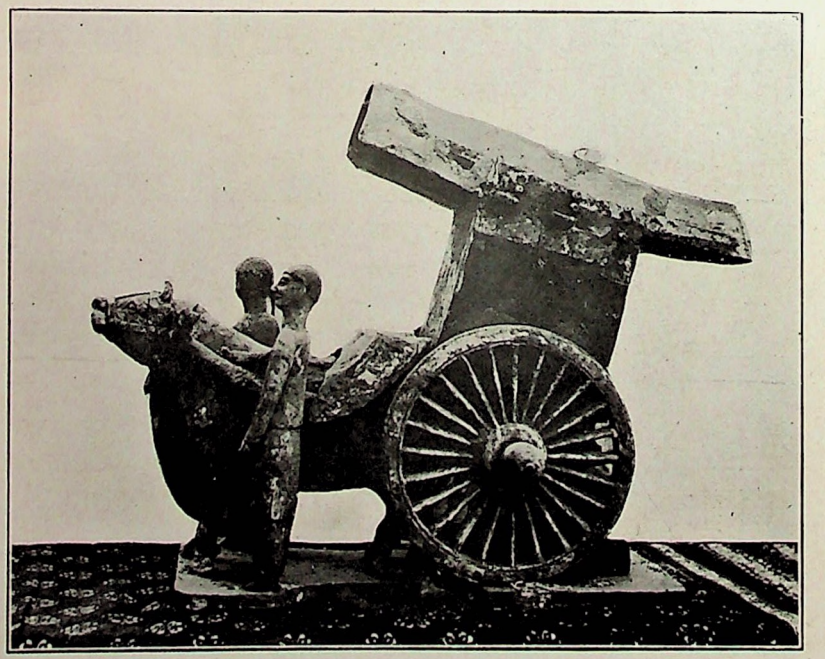
Drawing of an Ancient Chinese Raft from the San Ts'ai T'u Hui.



A Glazed Pottery Figure of a Horse, T'ang Dynasty.
(From the W. Bos Collection).

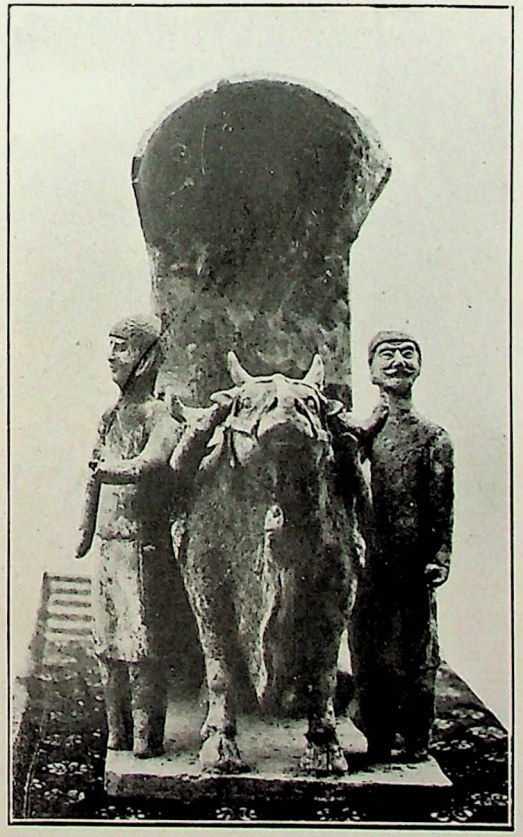


Carved Wooden Figure mounted on a Fabulous Chinese Lion.



Side View of an unglazed Pottery Tomb Figure of a Bullock Cart with Attendants, T'ang Dynasty.

(From the W. Bos Collection).



Front View of Same.



A Painting of Sixteen Horses attributed to Chiao Meng-fu, A.D. 1254 to 1322.



A Chinese Landscape Painting showing Pack Mules or Donkeys on a Road

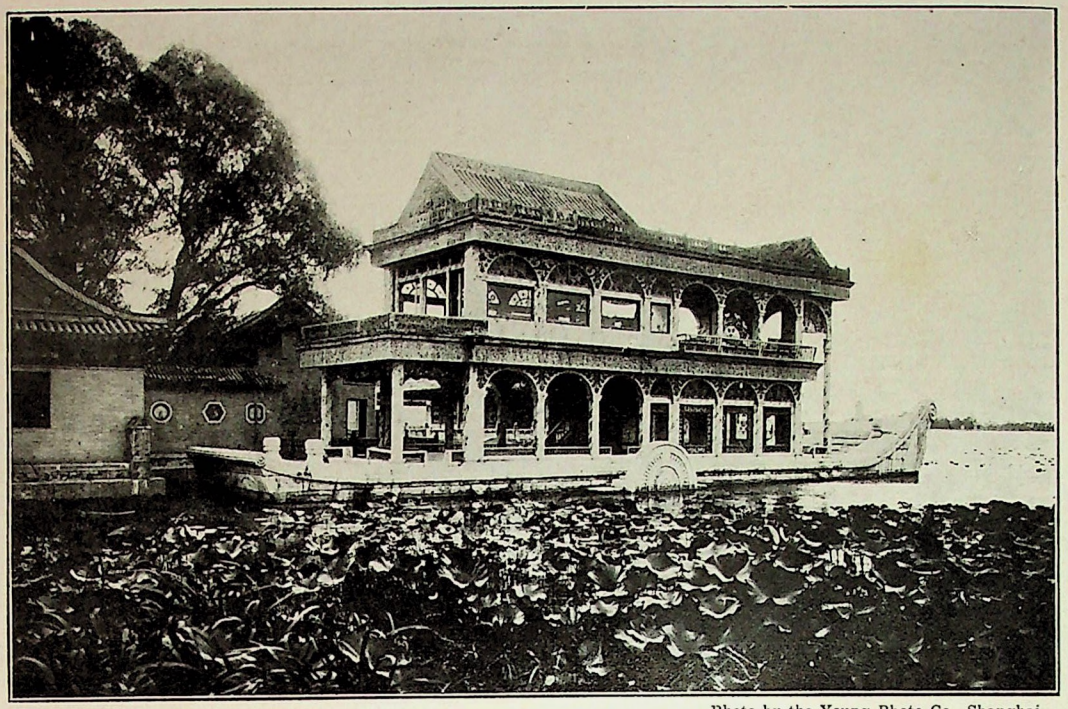


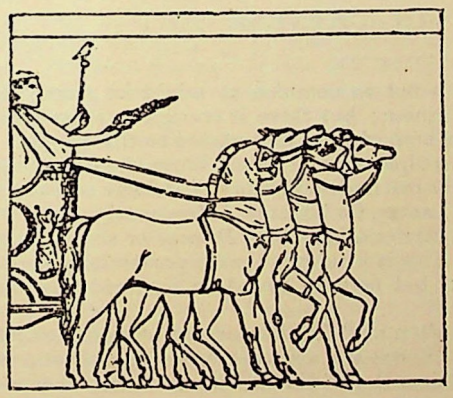
Photo by the Young Photo Co., Shanghai.

The Marble Boat built for the late Empress Dowager on the Lake at the Summer Palace, Peking.

section of the Chow Li was critically examined by the famous archæologist and scholar Yüan Yüan, A.D. 1764-1849, in an essay which is reproduced in Books 1055-6 of the cyclopedia Huang Ch'ing Ching Chieh (皇清經解). This essay is illustrated with drawings of the wheels, frame-work, poles and other details of carts. It also shows the way in which the yokes of a pair of horses were fastened to the pole. It contains a complete list of names for all parts of a cart, and explains these terms more clearly than I have ever met with in any other place. It is interesting to note in connection with names of the parts of carts that the term "wooden oxen" and "moving horses" (木牛流馬) are only names respectively for the pole in front of a wheelbarrow and for the handles for pushing it.

The Book of Odes has many references to carts as used in the various districts in which the odes were produced. There were the "carriages of the King's daughter" in the odes of Shao and the South, the "returning chariot" in the odes of P'i, the "great carriage" in the odes of the royal domain and the "barrows" and "wagons" of the Tu Jên Ssŭ. In the San Hu section of the Odes reference is made to "state carriages," *lu ch'ê* (路車). Of these the emperor had five classes, namely, those decorated with jade, metal work, ivory, hides and wood. I have seen many bronze ornaments used on early chariots including a bell for the end of the carriage pole (See Illustration). The empress also had five classes, decorated with different grades of feathers. The Book of Odes further mentions "war chariots" (戎車), of which there were five kinds, a large cart or "wagon" (大車), "service" carts (棧車) and "barrows" (輦).

There were open chariots in which the occupants stood. These were called standing carts, *li ch'ê* (立車) or *kao ch'ê* (高車). Carts in which the occupants sat on the bottom were called *an ch'ê* (安車). The



A Roman Triumphal Chariot from a Marble Slab.



A Roman Triumphal Chariot from the Reverse Face of a Coin.

standing carts were usually open and the sitting carts were covered, either with a canopy or a frame-work body covered with cloth or skin.

The carts usually had two wheels, but the San Ts'ai T'u Hui has an illustration of an *an ch'ê* which has four small wheels and resembles our type of vehicle known as brougham. Carts were drawn by one horse, ox or mule, by a pair of animals or by four animals abreast (See Illustration). The open chariots drawn by four horses closely resemble the quadriga used in triumphal processions in ancient Rome (See Illustration).

In the early bas-reliefs of Wu Liang Tz'ŭ and of Hsiao T'ang Shan in Shantung there are representations of scenes in which chariots are found. One of these is the meeting of Confucius with Laotze and another is the visit of King Mu to Hsi Wang Mu. In one scene at Hsiao T'ang Shan there is a state carriage with four persons in it drawn by two horses and another drawn by four horses. These resemble in general outline the illustrations found in San Ts'ai T'u Hui. They are also similar to the carts seen in the Ku K'ai-chih scroll in the British Museum. In the landscape painting of the Northern Sung Dynasty carts are often seen, especially in the work of Kuo Hsi. These are of the same type as those now used in northern China.

The Peking cart of the present day differs little if at all from the carts described in the K'ao Kung Chi section of the Chow Li. There have been no substantial improvements in type for more than twenty-five hundred years. The reason for this may be found in the lack of good roads.

TRANSPORT IN CHINESE ART

Transport in Chinese art is not as common as might be expected of a race as practical as the Chinese; but there is enough to show that this is a matter that has always been of great importance to this people.

In paintings, bas-reliefs, sculptures and stone engravings dealing with Chinese legends and myths one finds a number of strange creatures figuring as transport animals. Laotze, for instance, is frequently portrayed riding on a sika deer, which carries a branch of *Prunus* or some other flowering shrub in its mouth. This is a subject that is particularly common in brass or bronze work, but may be found in embroideries, on porcelain and in paintings.

Fabulous animals are also often used for the purpose of transporting sages or supernatural beings in Chinese art, amongst these being creatures somewhat resembling lions, unicorns (*chi-lin* or kirin), tigers, the so-called Chinese phoenix (*feng-huang*) and the like.

The elephant frequently appears in Chinese art carrying on its back some sort of howdah or pavilion, but seldom with a human burden.

Incidentally it is always a white elephant and is very much conventionalized. The elephant's head is not infrequently used in decorating the ends of out-jutting beams and eave-poles in temple buildings; while well modelled figures of it, along with figures of other animals and of human beings, frequently adorn the ridge tiles of the roofs.

But these are all mythical, and there is no indication that in the case of animals that actually exist, such as the deer and the elephant, they were ever used in China for transport purposes, at least during historical times. That the elephant existed in China in a wild state up to the time of the Hsiang Dynasty is indicated by figures of this animal which appear in the inscriptions on the old oracle bones from Honan ascribed to that period and a piece of a tooth of a young elephant discovered along with deer horns, turtle shells, implements and other relics from the Waste of Yin in that province.

Turning to that phase of Chinese art which deals with reality and not legend, that attempts to depict the every-day life of the people, or takes for its *motifs* subjects which the artist actually sees and knows to exist, we find that in various ways a very clear idea is given of how China has got along in this most important matter throughout the ages.

Very early in the art of the country we find mounted men, warriors, kings and sages, figuring. And the remarkable thing is the quality of their mounts. These are by no means the familiar China pony of to-day, but veritable horses, a little heavy in the body, perhaps, but of large size and with long arched necks. In the Tang and other early tomb pottery the horse is very prevalent, and here we have an animal along the lines of a European thorough-bred, long-limbed, long-necked, slender-headed, graceful creatures that leave us wondering how the Chinese could have had such magnificent horses at that distant date so long before the thorough-bred had been evolved in Europe, and what has become of this fine breed of horses. There are some very famous paintings and bas-reliefs of these fine horses, perhaps the best known being the painting by Li Kung-lin of the 11th Century A. D. known as "The Five Horses" or *Wu Ma*, which is in the Government Museum at Peking, and the stone bas-reliefs of five Imperial horses at Si-an Fu in Shensi.

In bas-reliefs and steles of an even earlier date, notably of the Han Dynasty, we find the saddle horse much in evidence. But this is not all, for we find also the chariot depicted, that is to say, two-wheeled vehicles drawn by one or more horses, and used apparently both for war and peaceful transport. Except that they have but two wheels, these in no wise resemble the modern Chinese cart. They are of light build, more like such Western vehicles as dog-carts, traps and even hansome cabs. One shown on a stone stele at Fei-ch'eng Hsien in Shantung * is particularly like the latter vehicle, except that it is drawn by four horses abreast. What might well be a hooded dog-cart, drawn by a single magnificent steed prancing along in fine style appears in relief

* Die Kunst Indiens, Chinas und Japan, by Otto Fisher, pl. 315.

on some bricks in a wall at Chao-hüa Hsien in Szechuan. * But in this there is a faint suggestion of the modern Peking cart, although it is a much lighter vehicle.

Amongst other interesting pottery tomb figures and pieces that have been discovered of late years are models of carts, chiefly drawn by oxen, which are not very different from those in use at the present time, and it might be suggested that the works of art already mentioned showed the vehicles and mounts of the idle rich, the officials and the military, while the more practical vehicles of the work-a-day world were only placed in the tombs for the use of the deceased in the next world. A fine example of a pottery model of an ox-cart appears in the accompanying illustrations. According to Dr. J. C. Ferguson in his article on "Transportation in Early China" landscapes of the Northern Sung Dynasty often have carts which are of the same type as those now in use.

Strangely enough, the pack animal does not appear in early Chinese art, with the exception of the camel amongst the pottery tomb figures of the Tang period. In later paintings, however, the pack-mule or donkey is introduced. The accompanying illustration is a section of a long horizontal scroll showing a number of pack-donkeys with their drivers on a highroad through mountainous country.

The water buffalo, often with a child, a herder or a field worker on its back, is very common in paintings of rural life and scenery, especially in modern Chinese paintings, while this animal is a favourite subject of wood carvers and brass workers. Amongst the so-called tea-root carvings for which Foochow is famous, the buffalo and boy *motif* appears frequently, the work often being exquisitely done, especially in the larger pieces, in which every hair on the animal is indicated.

On the whole it may be said that water transport much more frequently forms a *motif* or an element in Chinese art compositions, especially in paintings.

Hills, trees, human dwellings and water are each almost a *sine qua non* in a Chinese landscape, and the Chinese artist apparently succumbs as readily as his Western colleague to the temptation of putting some kind of craft on any piece of water he depicts. But, as pointed out by Dr. Ferguson in the preceding article, the boat is not found in early Chinese paintings, and it is only in more modern works of art that it appears. It must be further admitted that the use of the boat in Chinese painting has not progressed much beyond the introduction of small fishing punts or *sampans*, and it is to the so-called "Coramandal" and lacquer screens and cupboards of the present date that we have to look for a development of this *motif* to the point where sailing vessels in the distance are introduced. This is rather surprising considering to what an extent water transit is used in China, and must have been used even in the olden days of the great painters, not to mention the way the Chinese had developed their maritime trade, and, in their stout sea-going

* Ibid, pl. 314.

junks, had pushed their way to Malayan regions and even to the coasts of India.

One cannot leave the subject of transport in Chinese art without making reference to the marble boat that lies on the lake at the Summer Palace near Peking, which was built at the instigation of the late Empress Dowager, Tzu Hsi, as a safe means of taking a water voyage. This has the typical square bow of a Chinese boat, but there is a paddle wheel carved in stone on each side. A two-storied, glassed in pavilion provides shelter and entertainment for the passengers, and the marble blocks that form its hull, resting firmly on the bottom of the lake, no one is in danger either of the unpleasant effects of a rough passage or of finding a watery grave. For the rest, it stands a monument to the decadence of Chinese art towards the end of the Ch'ing Dynasty, and indicates what may be expected from the impact of the machine civilization of the West upon age old civilizations and artistic traditions of the East.

CHINA'S TRANSPORT WORKERS, MEN AND BEASTS

BY

ARTHUR DE C. SOWERBY

Amongst all the many millions of workers in China there is one class that may be considered almost of more importance than all the rest, and that is the great army engaged in one way or another in transport. It may be argued that since man's first and foremost need is food, the farmer is the most important member of a human community. This to a certain extent is true, but it is equally true that there can be but little benefit to the rest of that community in the farmer's growing rice or wheat if there is no means of distributing it. China's means of transport being far behind the times as regards mechanical devices like the railway engine, the automobile, the steamship or the motor vessel, it follows that food and other necessities of life must be carried from the producer to the consumer by some other agency, either by the use of animals or by man himself. And China being a highly civilized country in its way, it also follows that a great many more things than food have to be transported from place to place ; all of which means that the number of individuals engaged in that occupation is very great indeed. One has only to travel along a road, a country path, a canal or a river in China and note the never-ending streams of people passing along them in some way or other engaged in the task of moving something from one place to another to realize what a large proportion of the community belongs to the class of transporters. They may be driving carts or pack-animals

punting, towing or sailing boats, pushing wheelbarrows or even carrying loads on their backs or slung at the ends of bamboo poles, but their occupation is transportation. Their number is immense, and they must in their totality comprise fully a third of the community.

And if we examine these carriers, these transport workers of China, we shall find that while they have one great thing in common, their occupation, they yet are extremely diversified, falling, according to the kind of transportation to which they are slaves, into distinct groups. So distinct, indeed, are these groups or classes, they might almost be said to form sub-races, for their members develop features of mind and body that are definitely characteristic. In no country in the world, except, perhaps, India, where the caste system prevails, does heredity count for so much as in China, where a man belongs to a profession for no other reason than that his father and grandfather and great-grandfather before him belonged to it. Under this strong influence an occupation naturally stamps its indelible mark upon a given line of descent, so that in China one can generally tell a carter or a muleteer, a camel driver or boatman the moment one sets eyes on him. They conform to types, do these toiling sons of transport in China, and it is these types along with their settings that it is proposed here to examine briefly.

In North China and Manchuria, where wide expanses of dry plains make it possible, there is a great deal of cart traffic, and we meet our friend, the jolly carter.

He is usually a Chihli man, for the headquarters of the carter's clan is located on the great Chihli plain, and it is here that the cart is most in use and has developed to its furthest point. The Peking cart, with its one handsome she-mule, is the very acme of native Chinese equipages, while the great rough carts, or *ta chê*, of this province are the last thing in vehicular freight transport, carrying as they do some two thousand catties * of goods and being drawn by three to five animals, one in the shafts, and the rest abreast in front held by strong raw hide or hemp traces attached to the axle tree. There is only one axle tree, since there is only one pair of wheels, and the carter must know his business well in packing his cart, as it is necessary to preserve a nice balance, lest too much weight fall upon the shaft animal. Built for strength, these carts are heavy, clumsy contrivances, but they are serviceable, and, properly handled, accomplish wonders. To be a good driver a man must be able to command his lead mules by word of mouth, since, although reins are employed, they are very primitive and are used mainly for checking and controlling a fractious animal, not for guiding. The carter's position in driving is on the left side just in front of the wheel, and he spends his time between walking and sitting on the shaft.

There is a very good reason for the use of carts with only two wheels. The roads are, by comparison with roads in other countries, so bad and rough that four-wheeled wagons could not be taken over them. In order to stand the strain to which they would be subjected when crossing rocky hills or mountain ranges, or traversing the plains in wet weather when

* One catty is equivalent to one and one-third English pounds.

the roads are mostly little better than quagmires, they would have to be so stoutly built as to be altogether too heavy and unwieldy. In Anhwei Province, a low-slung, four-wheeled cart is used, mainly by farmers, while on the Ordos Border in North Shensi and Shansi a light cart with wheels four or five feet in diameter is used, mainly for carrying fodder.

So bad are the roads from Kirin, in Central Manchuria, to the Tibetan border, that carts usually proceed in caravans with the idea of giving mutual aid in case of accident or trouble. Thus, when particularly bad spots in the road are encountered and a cart gets bogged down, the teams from the other carts are brought to the rescue, and one may see as many as a dozen animals fastened to one cart in an endeavour to extricate it from its difficulties. Similarly, as in the case of the Lu Pan Range, on the road to Lan-chow Fu in Kansu, when a high pass has to be crossed, all the mules from two carts are used in turn on each cart to get it over the barrier.

This necessity for mutual aid tends to produce a camaraderie amongst carters, who are, as a rule, well-built, healthy individuals of jovial countenance and friendly disposition, albeit their life upon the great highroads and in the great cart inns along the latter makes them inclined to be truculent, and it is not well to come into conflict with them. The Chihli men are notoriously hot-tempered and quick to fight. The same applies to the Honanese, from which province also many carters come. Another source of supply for this profession is the distant province of Kansu, where a large number of Mohammedans have become carters. In certain parts of Shantung also carts are employed a great deal, and it is from the ranks of the Shantung carters that those employed in this profession in Manchuria are mainly drawn, although Chihli also contributes its quota.

On the great plains of Shansi that lie between the mountain ranges of that province carts are extensively used, but the Shansi people are very insular, and men from other provinces are not popular. Thus the carters here are mainly natives of the province.

In the extreme north of this province a distinct change in the cart appears. The wheels instead of having spokes are made of a comparatively few pieces of wood and are fastened solidly to the axle-tree. The latter fits into two sockets on the under side of the cart, wheels and axle-tree revolving together.

The day's run of a cart is usually from 80 to 100 *li* for the *ta chê*. A *chiao chê*, or Peking cart, with a mule in the shafts and a single lead mule, proceeding at a slow trot or fast walk, may do as much as 130 *li* in a day, which is equivalent to about 40 miles. The *chiao chê* is the favourite mode of travel for passengers, the *ta chê* being reserved for freight and the merchants who own it.

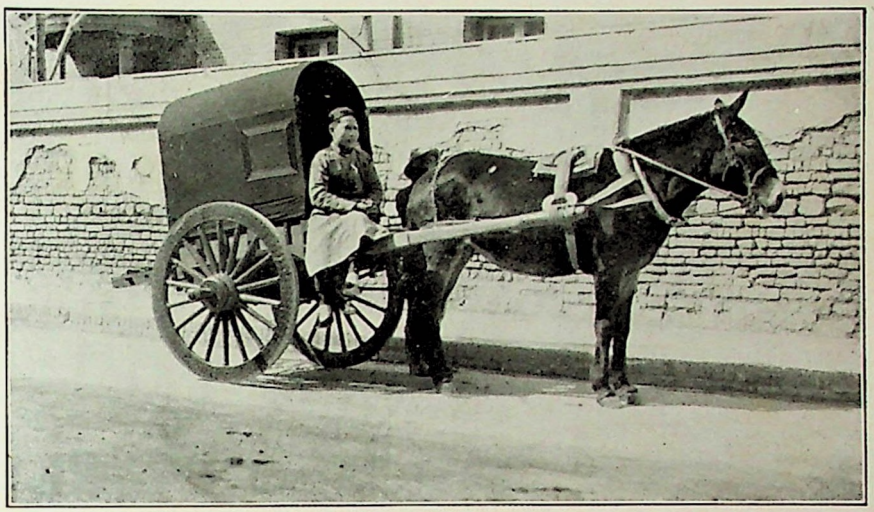
Animals employed in drawing carts are usually female mules, but pony geldings or mares are also used, as well as donkeys, the last, of course, only as lead animals. Where the roads are mainly on the flat, and speed is not an essential, large draught oxen are used, their position always being between the shafts, where extra strength, weight and size are needed.

Oxen, too, are very extensively used by farmers for draught purposes, being useful for ploughing as well as for pulling carts. But the ideal team for fast and heavy work on the great highroads consists of, say, a fourteen-hand she mule for the shafts and three clean-limbed she mules of lighter build in the lead. A man with such a team and a good stout cart is the envy of the whole fraternity of carters, for he earns the best money and is always sure of employment.

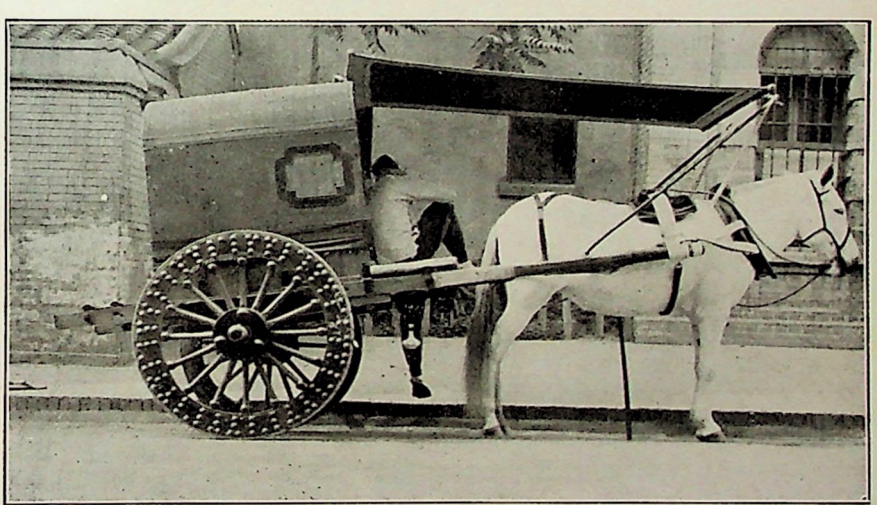
The only rest a carter and his animals ever get is when inclement weather renders the roads impassable, or when he is forced to lie idle for want of a fare or business. Payment is arranged in various ways, but usually it is on the basis of so much for the journey, either per cart or per picul (100 catties or about 130 lbs.), and as soon as one journey is completed and paid for the carter is ready to start again. He keeps a running account with some innkeeper at either end of his beat, and it is the innkeeper's business to secure him work, to arrange prices, even, if necessary, to keep him and his mules when employment is not forthcoming. When it is, an advance payment of part of the total sum agreed upon for the journey is made by the merchant or traveller to the innkeeper, who deducts as much as he can on account, giving the remainder to the carter for his expenses along the road. When a journey of more than a day or so is contemplated, a regular contract is drawn up between the traveller and the carter, and once, with the help of the innkeeper, the terms have been agreed upon and the contract signed, one need as a rule fear no trouble as to their fulfilment. But one should take care not to drive too hard a bargain, and to seek out an innkeeper with a good reputation in the first place.

The drivers of hire carts in large cities, like their counterparts in other countries, taxi-drivers, cabbies and the like, are a hard-bitten crowd, a necessary evil, but the carter of the open roads is by comparison an honest, manly fellow, and on a long journey one may become very attached to him.

The same applies to the muleteer, though, perhaps, to a somewhat greater degree. Here is a man from the hill country of Shansi or Honan, and where in the world are not the dwellers in the hills and mountains more lovable than the plains dwellers ? Usually above the average height and of fine physique, the muleteer has an open countenance and a frank and simple disposition. His strenuous life in the open, regardless of weather conditions, the broiling sun of summer or the bitter winds of winter, have left their mark upon him : he is a hardy, healthy, pleasant spoken fellow, always with a song upon his lips or a curse for his unruly mules or a cheery word of greeting for the passer-by. As a rule the Chinese muleteer is superior in physique even to his hardy colleague the carter, probably because his life is harder. His route lies through mountainous or hilly country where carts cannot go, and where good food is scarce and the inns wretched as compared with the comfortable and well-appointed (comparatively speaking, that is) inns of the plains with their superior sleeping quarters and cuisines. Also his charges, the pack mules from which he derives his livelihood, are much harder to manage than anything the carter has to cope with. For only stallion mules are



A typical Peking Cart. Note the size of the Mule. Only the best Female Mules that can be secured are used for this Purpose.

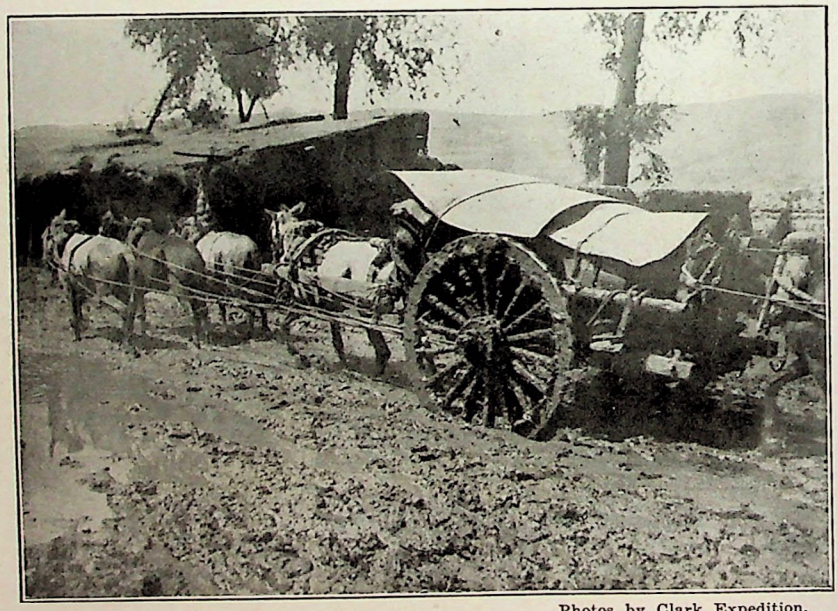


Photos by Hartung, Peking.

The last word in Chinese Vehicular Transport. A well-appointed Peking Cart.



Chinese *Ta Cheh* or Great Carts on the Great High Road that runs from Eastern Honan through Shensi and Kansu into Chinese Turkestan.

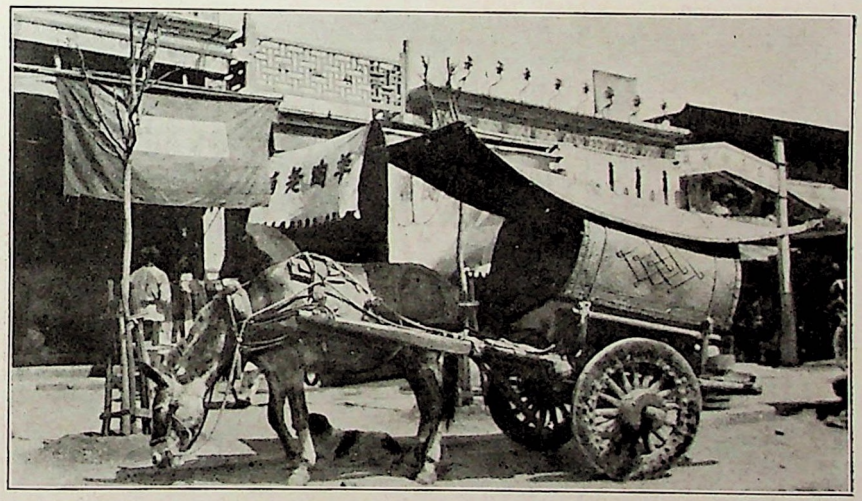


Photos by Clark Expedition.

What a Road can be like in Wet weather in Kansu, North-West China. These two Pictures show well the Arrangement of the Team in a Chinese Freight Cart.

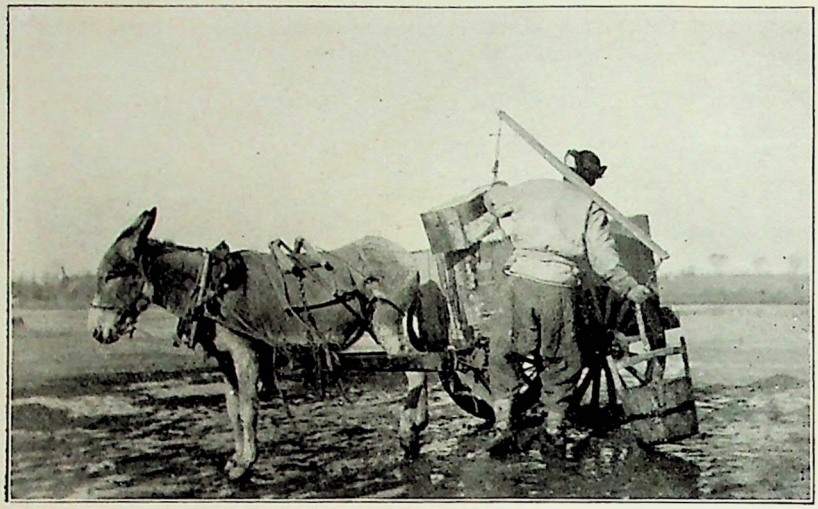


Sorry Beasts straining at an over-loaded Great Cart, North China.

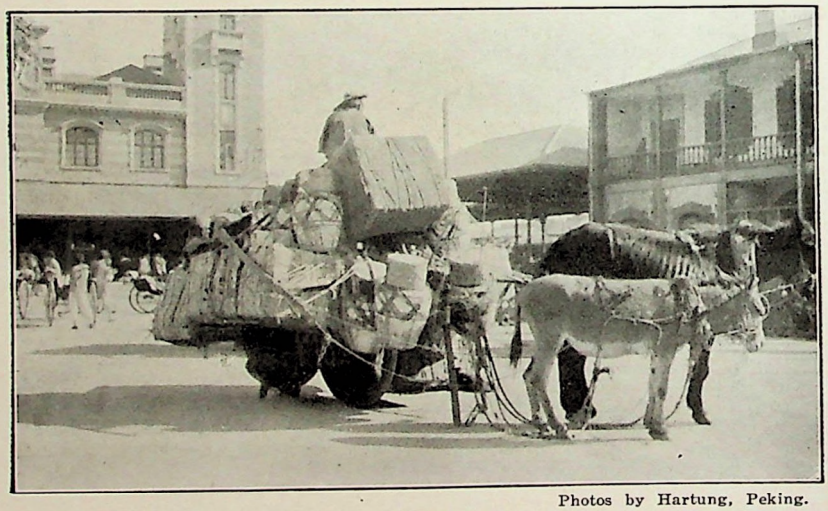


Photos by Hartung, Peking.

A Great Cart of North China fitted for carrying Passengers on a Journey. Note the Reed Matting Hood which has been added.

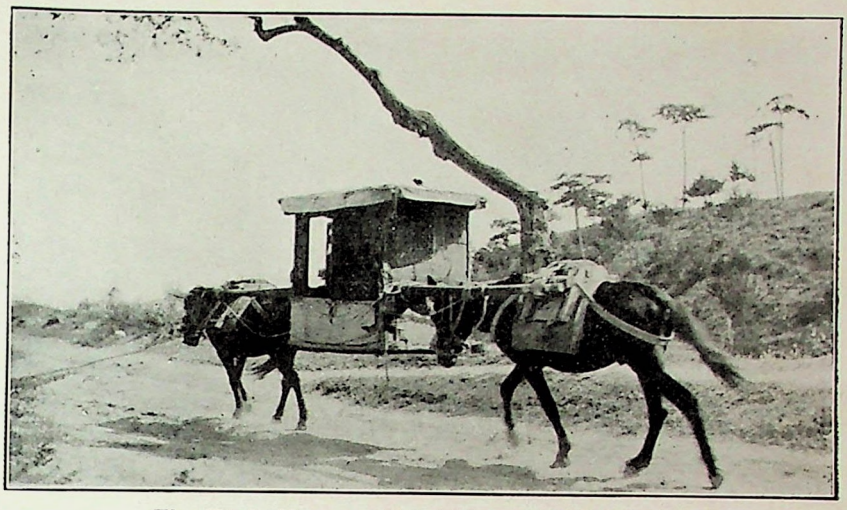


A Peking Water-cart drawn by a Donkey. Note the Water-buckets slung on a *Tan* or Shoulder Pole.



Photos by Hartung, Peking.

How a Wheelbarrow may be loaded. Taking Goods from a Railway Station to their destination in the Country. A Mule and a Donkey are hitched up to the Barrow.



The *Tuoh Chiao* or Mule Litter of North China.



Photos by Hartung, Peking.

The Mandarin's Sedan Chair.

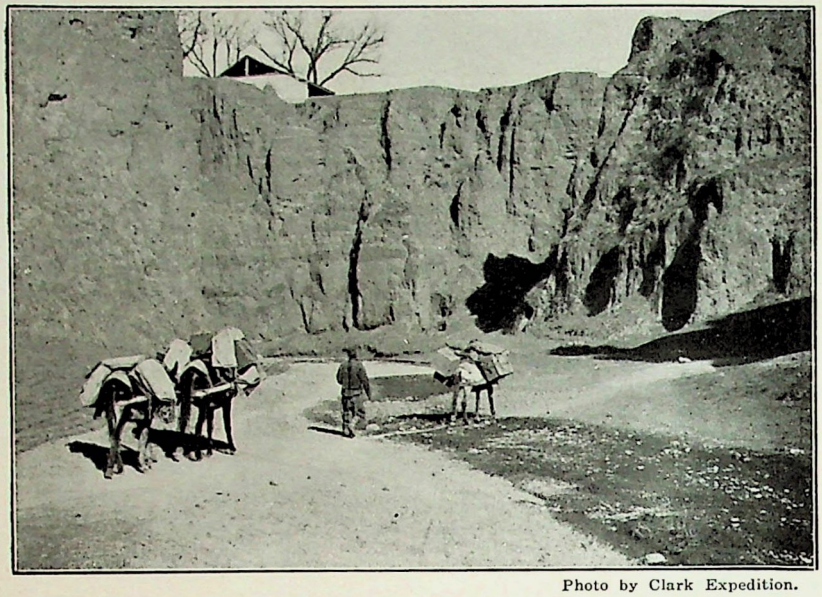


Photo by Clark Expedition.

Pack mules and Muleteer in Honan, North China.

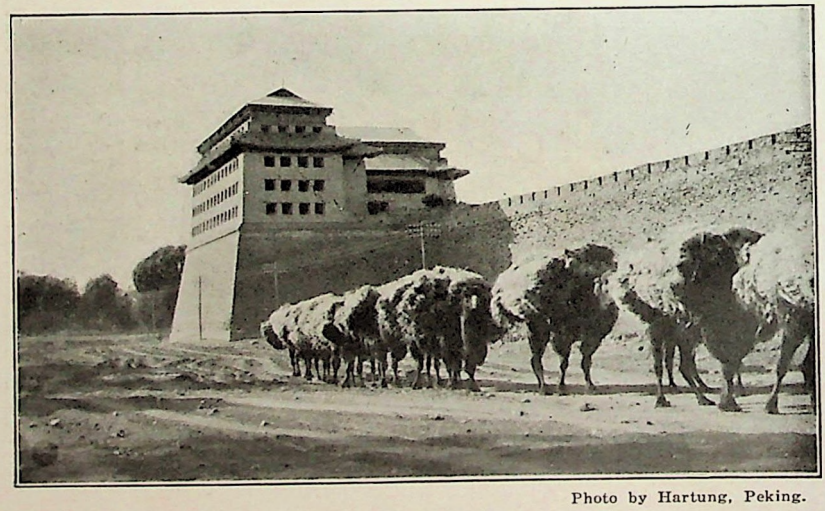


Photo by Hartung, Peking.

Loaded Camels outside the Walls of Peking.



Photo by Hartung, Peking.

Donkeys carrying Loads bigger than themselves. In this case the Loads are of Hemp Stems for Fuel, but such cruel over-burdening is a common Sight in China.

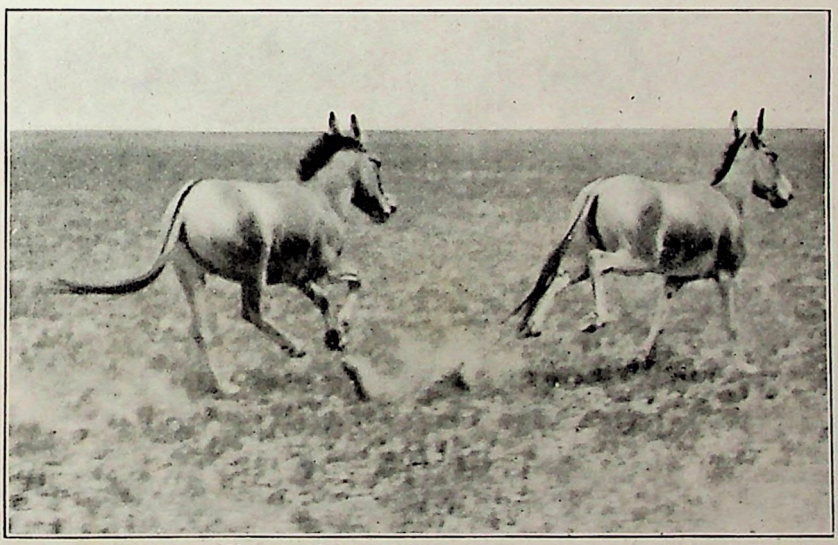


Photo by Courtesy of the American Museum of Natural History.

The Wild Ass or Kiang (*Equus hemionus*) of Mongolia and Central Asia. This is not the Progenitor of the Domestic Ass or Donkey, the latter being derived from the African Wild Ass.

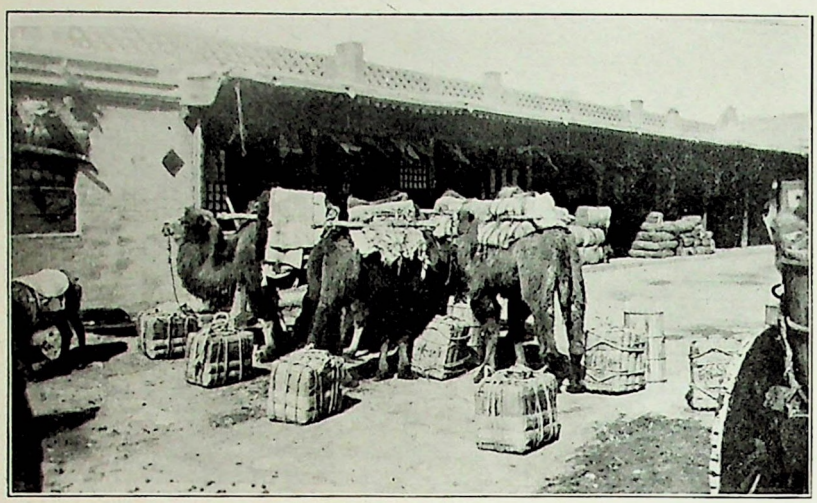
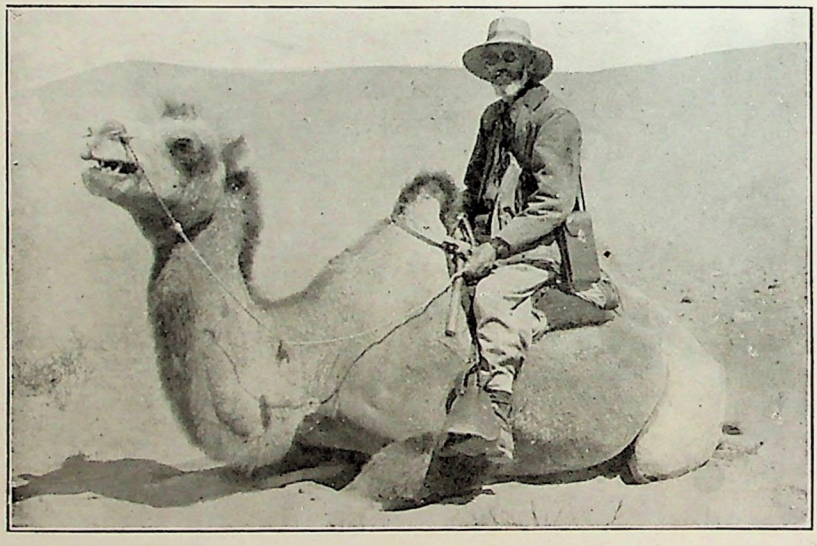


Photo by Hartung, Peking.

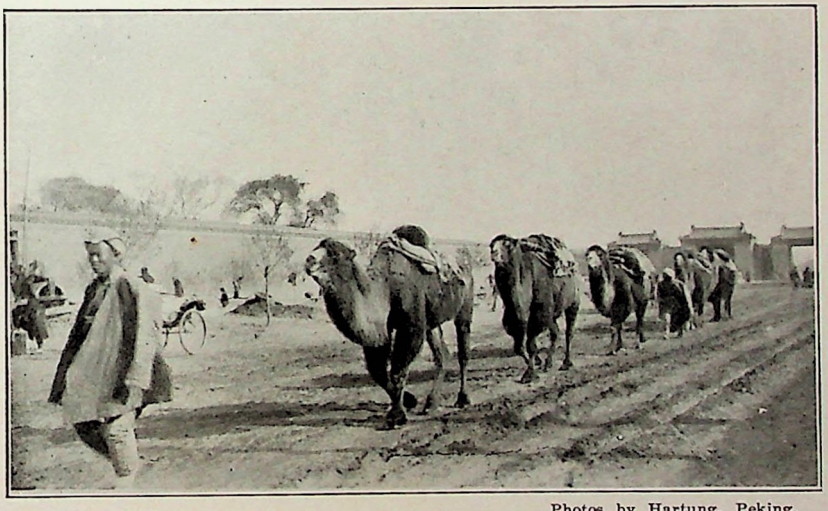
A Camel Inn in North China, with Camel's waiting to have their Loads of Tea for Siberia put on.



The Camel is the most Cantankerous of all Beasts of Burden. Here is a fine example of the Bactrian or Two-humped Camel, used in Mongolia and neighbouring Areas of North China and Central Asia, with a member of the Third Asiatic Expedition of the American Museum of Natural History on its Back.

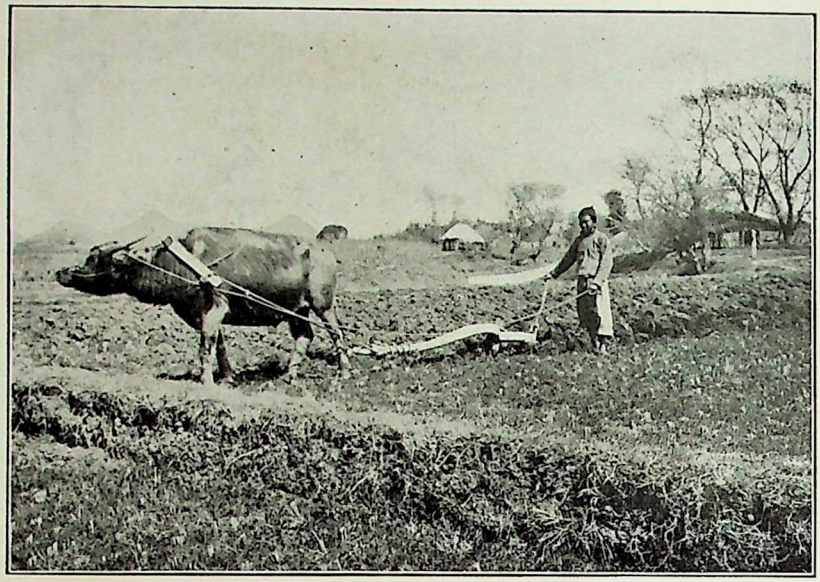


Camels carrying Coal near Peking.

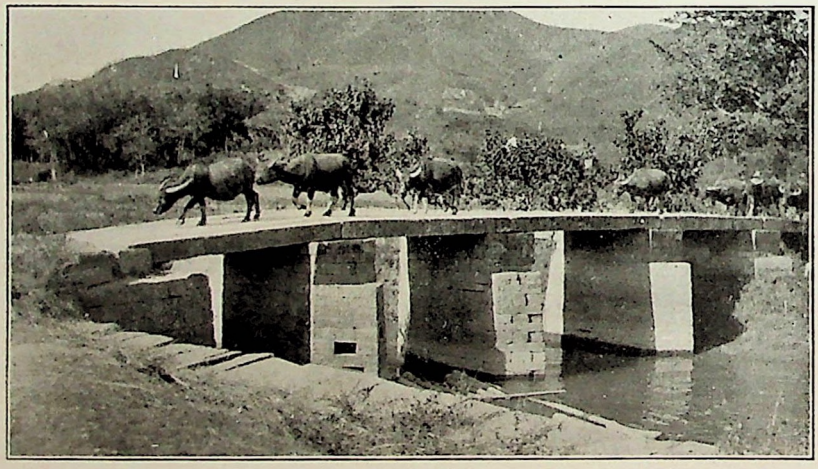


Photos by Hartung, Peking.

A String of Bactrian or Two-humped Camels on one of the Streets at Peking.



A domesticated Water Buffalo drawing a Plough in a Rice-field. Its ability to walk through deep Mud, and its great Strength make the Water Buffalo eminently suited to this Task.



Domestic Water Buffaloes going out to Graze from a Village in the Hangchow District, Chekiang, East China.

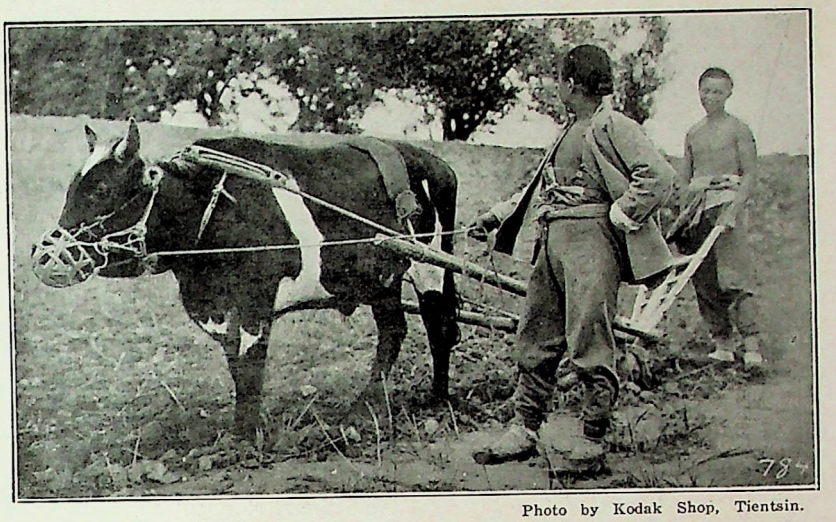
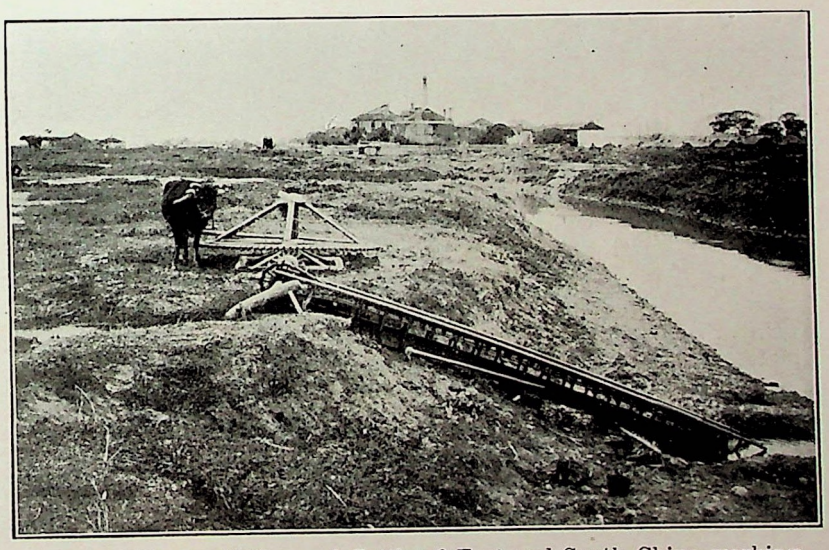
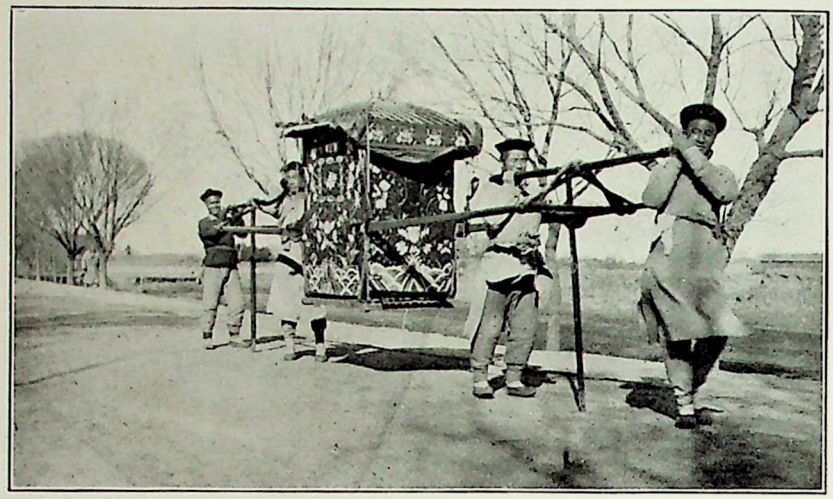


Photo by Kodak Shop, Tientsin.

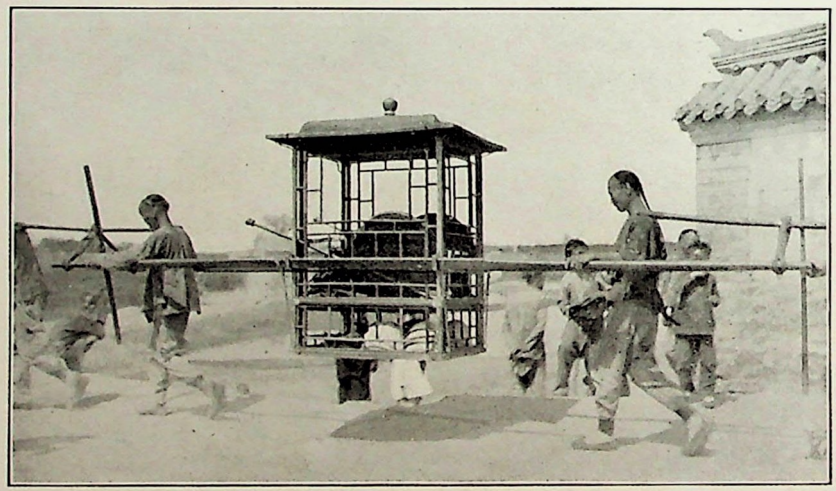
A Young Ox drawing a Plough in North China.



One of the small Humped Cattle of East and South China working a Water Wheel Native Pump.



A Bridal Chair on the Way to fetch the Bride to her future Husband's Home.



Photos by Hartung, Peking.

The Sedan Chair in Undress, showing the Framework and Construction.



The North China Wheelbarrow; Emblem of China's old Civilization.



Photos by Hartung, Peking.

Carrying Dirt in a Wheelbarrow on a Farm in North China.



Photo by Kodak Shop, Tientsin.

The *Paitze* or Passenger Sledge used on the Creeks and Canals in Winter in Chihli, especially in the Tientsin District.

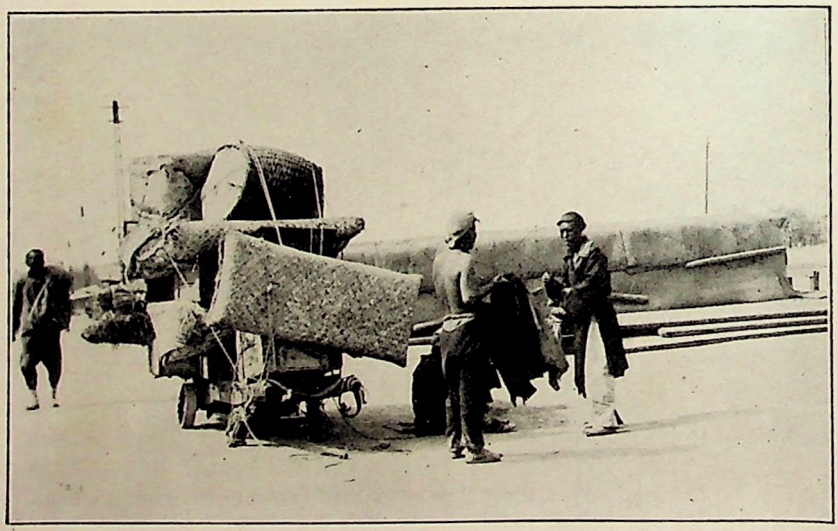


Photo by Hartung, Peking.

A Handtruck as Loaded in China and drawn by Coolies. Part of the Man-power System of Transport in China.

used for pack purposes, and anybody who has had anything to do with stallion mules knows what that means. The reason for this is that a stallion mule can carry so much more on his strong back than any other animal of the same size and weight. For this reason they are never gelded, being far too valuable as they are for pack purposes. A good stallion mule will carry as much as 240 catties, which is equivalent to 300 lbs., and does not include his heavy pack saddle. A gelded mule of the same size can carry little more than 150 catties, which is also about the weight a pony will carry. A female mule is never used for pack purposes, always for hauling carts or for riding. At times stallion ponies are used as pack animals, especially in out-of-the-way districts, while donkeys, both male and female, are used very extensively for this purpose, especially in the coal-mining areas of Shansi, where one may pass thousands of these little animals plodding sturdily along with loads that look almost as big as themselves.

The means of transporting passengers in districts where only pack mules and donkeys can be used is the mule litter, of which there are three types, called respectively the *tuo-chiao*, the *er-ma-chü* and the *shên-tze*. Of these the *tuo-chiao* is the most stylish, though not the most comfortable. It is shaped like a Mandarin's chair, though of stouter, stronger build, and has three doors, one on either side and one in front, fitted with glass windows. The occupant can sit up comfortably as in a carriage, and on cold or wet days can see out through the windows. In fine weather the front door is lifted up and the side ones tied back, so that plenty of fresh air may be enjoyed. A stout pole passes through the body of the litter from front to back on either side, and by this means the whole contrivance is slung between two mules, the total weight, including the passenger, his bedding roll and a few belongings, being about equivalent to two ordinary mule loads. The disadvantage of the *tuo-chiao* is that one gets terribly cramped sitting up all day long, while the constant jerking backwards and forwards adds to one's discomfort and fatigue. When the mules are badly matched as to step, this jerking and jiggling amounts to positive torture, especially on rough mountain roads. The *er-ma-chü* in this respect is, if anything, worse, and while it is somewhat more roomy inside, has no glass windows, so that in bad weather the passenger experiences all the sensations of being bumped about in a closed box. This type of litter is not nearly as common as are the other two. It is composed of a wooden frame, overlaid with reed-matting, and is generally painted a dull red colour. It is fitted with a sliding door on either side. By far the most comfortable of the three types of litter is the *shên-tze*. This is a home-made contrivance, the component parts being two long barked, but otherwise un-dressed poles, the two halves of a pack frame, a few bamboo loops, ropes and some reed matting. The halves of the pack frame are inverted and tied by their ends, at from five to six feet apart, to the two poles, thus holding them parallel to each other about two and a half feet apart. A stout rope is woven loosely backward and forward to form a sort of cat's cradle between the two poles. The bamboo loops are tied so as to form the ribs of the hood, which is made by tying the matting over them. The passenger's belong-

ings are dumped into the cradle of ropes at the bottom, and his bedding laid lengthwise over them. Properly arranged, this makes a very comfortable couch upon which the traveller may lie at full length or sit up crossed legged, or even with his legs hanging over the front end. The back of the hood is blocked by a piece of matting, and entrance and exit are made through the front. The advantage of the *shên-tze* is that it is lighter and therefore faster than the other types of litter, and there is seldom any difficulty in securing one, since the component parts are always available, while every muleteer worth his salt knows how to construct the contrivance on the spot. It is cheaper as well, and, because of its lightness, can carry more of the passenger's personal baggage.

Driving a litter naturally calls for greater skill on the part of the muleteer than the driving of pack mules, though it should not be imagined that the latter is an easy task. Here, again, control is largely by word of mouth ; but stallion mules are so full of devilment and are so tiresome, especially in the presence of horses, that three is the maximum number any muleteer can handle; that is to say, three pack mules or a litter team and a single pack mule or donkey.

Owing to the methods of packing the loads, the latter need constant attention. These are not tied on to the mule, as in other countries, but are tied on to pack-frames or trees, which in turn fit into the heavy wooden saddle. Even the saddle is not fastened to the mule, merely being slung across its back, with loosely fitting leather belts round the neck and back of the buttocks. The result is that if a mule begins to kick, rear or canter, the whole contrivance, pack and saddle and all, soon falls off. The advantage of this arrangement lies in the time that is saved in loading and unloading the mules, since the load may readily be lifted off and on, and does not require to be packed and unpacked each day.

Pack animals are exclusively used over large areas of Shantung, Northern Chihli, Shansi, Honan, Shensi, Kansu and Szechuan—anywhere, in fact, in the north where carts cannot go. They are not used much in the Yangtze Valley, and very little in China south of that great river, where their place is taken mainly by men and women carriers.

Pack mules are usually decorated with pompadours and tassels of red hair and large glass beads, while each carries a brass bell or a number of bells fastened to a leather collar round its neck. By listening to the sound of these bells the muleteer knows whether or not his animals are behaving.

As already stated, the muleteer is usually of cheerful disposition and is prone to sing. His songs are the songs of the road, picked up in different parts of the country, and many of them are very tuneful and haunting. The jingling of the bells, the songs of the muleteers and the squeak and creek of harness and pack-frame combine to make a medley of sound that, once heard, can never be forgotten. It is the music of the pack train, and undoubtedly helps to while away the tedious hours of travel, the long day's march from dawn to dusk. It is only beaten by the din that arises when the inn is reached at night, and the braying of the mules mingling with the shouts of their drivers and the inn lackeys lifting off the loads creates pandemonium. The air is filled with the

smell of burning charcoal and of stables as the weary traveller alights from his litter and seeks the comfort of a warm *kang* or brick bed and newly-steeped tea. What the relief must be to the mules themselves and their dust-covered masters can only be imagined.

The bugbear of the muleteer's existence is the camel-driver and his camels. According to the old laws the camel was only allowed to travel at night, for the reason that mules have a pronounced aversion to camels, and when a camel and a mule train pass each other on the road there is almost always serious trouble, not infrequently ending in fierce fights between the muleteers and the camel-drivers. But this is not the only reason why camels travel at night. There is a much more important economic reason, and that is that the camel, a cross-grained animal at best, will only feed and rest properly during the day. He takes his food lying down, and a camel inn is characterized by long low troughs built of bricks and plaster upon the ground. Carrying from three to four hundred catties, and needing only comparatively coarse food, the camel as a pack animal has its advantages. It is very slow, however, and is exceedingly awkward on slippery ground, while it requires several months of rest during the summer. It is, however, used extensively in the north, especially in the regions adjoining Mongolia, and, of course, it cannot be beaten when it comes to travelling in the howling wastes of the Gobi and Ordos Deserts or in the arid regions of Chinese Turkestan. Indeed, its main use is for the transport of various commodities from the great cities of North China to far distant towns of Central Asia and Mongolia, and bringing back such articles as wool, skin, hides, salt and the like. Formerly the camel was extensively used in the transport of tea from Hankow to the Siberian border. Even to this day it is used to bring coal to Peking, where, outside the south wall of the Tartar city, camel trains are a common sight. Throughout Shansi, Shensi, Kansu and Honan this animal is frequently to be met with, plodding patiently along in strings of five, often in huge caravans containing hundreds of individuals. Each camel has a wooden rivet through its nostrils, to which is attached a light rope, which in turn is fastened to the camel in front. The last camel in every string of five carries a large, deep-toned bell, and as long as the driver, who walks in front leading the first animal, hears the booming of this bell he knows his charges are safe. Ghostly and noiseless these great animals loom up in the dark as they pass one at night, and there is little wonder that mules take fright at them. Not infrequently the caravans are accompanied by huge savage dogs of the breed commonly known as the Tibetan mastif, especially caravans whose route lies through Mongolia. These dogs are dangerous beasts, being led on heavy chains by one of the camel-drivers, and woe betide any stranger who falls foul of them. In Mongolia a large cart, shaped like a Peking cart, but large enough for the occupant to lie down in, and to carry a small charcoal stove, is used for winter travel, and is drawn by a camel.

As might be expected, the camel driver is a taciturn fellow. Association with so cantankerous an animal as the camel, his lonely night marches, and the dreariness and danger of the country through which he eternally

passes, are responsible for this, added to which he has probably more than a touch of Tartar or Mongol blood in his veins, which helps to make him morose and surly with strangers. But he is an expert packer and incredibly hardy, as well he needs be, for his lot is even harder than that of the muleteer, his fare being coarser and exposure to the mercy of the elements more trying.

Probably the most peculiar of China's pack animals is the yak, domesticated and hybridized. The yak is the transport animal of Tibet, as it alone can stand the bitter cold and high altitudes of that mountainous upland, and it is along the borders of Tibet that it is used by the Chinese. Another important member of the *Bovidae* that is extensively used in China is the water-buffalo. As, however, it is used only for ploughing up the heavy soil of rice-fields and for turning water-wheels it cannot be classed as a transport animal. As already stated, in China north of the Yangtze, where conditions permit, a large ox is extensively used for drawing carts, while in Mongolia a smaller type is used to draw the small carts that bring salt from the Gobi into Kalgan. From the Yangtze Valley south a small humped ox is used for drawing ploughs and turning water-wheels.

Much as draught and pack animals are used in China, it is probable that, taken as a whole, by far the greater part of this country's transport is accomplished by human agency without the help of animals. The wheelbarrow, for instance, is used so extensively that it might well be looked upon as the emblem of China's transport. There are two main types of wheelbarrow in use: one a flat, small-wheeled machine, used for casual and light transportation; the other a large, heavy, stoutly-built contrivance with a large wheel, the upper part of which passes through the floor of the barrow and is protected by a cage-like frame. Goods to be transported are fastened on either side of this frame. A coarse shoulder band attached by hooks at either end to the handles of the barrow allows the weight of the latter to be taken on the neck and shoulders of the coolie, leaving his hands and arms free to balance and guide the clumsy contrivance, which is moved forward by his pushing against the shoulder band. By this means loads weighing several hundred pounds can be transported from fifteen to twenty miles a day, and in Shantung, Chihli, Honan, Shansi, Shensi and Kansu enormous quantities of goods are thus carried along the highways and byways. It is cruelly hard work, and the poor wheelbarrow coolie usually suffers from an enlarged heart and does not last long at his occupation. When recruiting was taking place in Shantung for the Chinese Labour Corps in France during the Great War, it was found that nearly all the wheelbarrow coolies were suffering from heart trouble, so much so, indeed, that it became the rule amongst the recruiting agents to reject all applicants that showed the calluses on the neck and shoulders that characterize the wheelbarrow coolie without subjecting them to any further medical test.

Another human draught animal in China is the rickshaw coolie, the puller of that iniquitous little man-carriage that is so useful a means of local transport in the treaty ports and larger towns of the interior. Here, again, we have a willing wage slave whose occupation ensures an

early death. It is said that the expectancy of life of a wheelbarrow or rickshaw coolie is from five to eight years from the time he takes up these occupations.

On the upper reaches of the Yangtze, where junks and houseboats have to be pulled up the rapids, a terrible state of affairs exists. Naturally animals cannot be used for towing the boats up stream here for the simple reason that there are no proper paths, the wretched coolies employed on the job having to clamber over boulders or along cliffs, at times hanging on like flies, with death as the penalty of letting go. Hundreds of coolies are sometimes necessary to get a single vessel up the rapids, and so severe is the strain, and so fraught with danger to the boat and its valuable cargo of freight and humanity would be the slackening of effort on the part of the tow-coolies, the latter actually submit themselves to the lash of an overseer, who does not hesitate to use it on their sweating, naked backs. This, perhaps, is the outstanding crime of human transport in the whole of China: it is only a very small step from actual slavery, since, one way and another, the wretched victims are practically unable to escape once they have joined the ranks of the tow-coolies.

The next category of human transporters in China is that very large class including chair-bearers and carriers or porters using the bamboo pole, known as a *tan-tze*, which is carried on the shoulder with a load depending from each end. All over China this latter method of transport is very much in vogue. It is handy and convenient, and by its means a strong man can earn a fairly good day's wage, given certain other advantages. Pedlars almost invariably use this means of transporting their wares. On the highroads of North China it is no uncommon thing to see hundreds of fairly-well-dressed pedlars from all parts of China swinging along with their quick, short steps at an incredible speed, taking short rests every mile or so. These men are carrying wares of all sorts from one part of the country to another. Disposing of these wares at the end of their journey, they quickly purchase some local commodity that will yield a good profit, and back they go whence they came, only to repeat the journey again and again. Their journey may be a short one of a day or a few days' duration, or it may stretch clear across the country, from, say, Shantung to the New Dominion or Hsin Chang, as Chinese Turkestan is called.

In and about cities, in the fields, wherever construction or demolition work of any sort is going on, *tan*-coolies are employed, carrying bricks, earth, débris, stone, grain—anything, in fact, that can be carried this way. Some of these constitute the very dregs of humanity in China, since no particular intelligence is called for, while the loads carried, and the consequent remuneration, can be fixed according to the carrier's capacity. One only has to see a ragamuffin crew engaged on excavating a creek in Kiangsu or Chekiang, the coolies carrying their little basket-loads of mud from the creek bottom to the adjoining fields, to realize to what depths of degradation suffering humanity can sink. A few cents and a couple of coarse meals a day is their wage, and they work from dawn to dusk, sleeping on rice straw on the floor under rough shelters at night. This is the cheap labour that one hears so much about in the

East. Railway and motor road construction in China must depend mainly on this kind of labour if it is to be accomplished within the means at the disposal of the government or local authorities ; but it is a gratifying thought that every completed road or railway line makes this kind of labour more impossible.

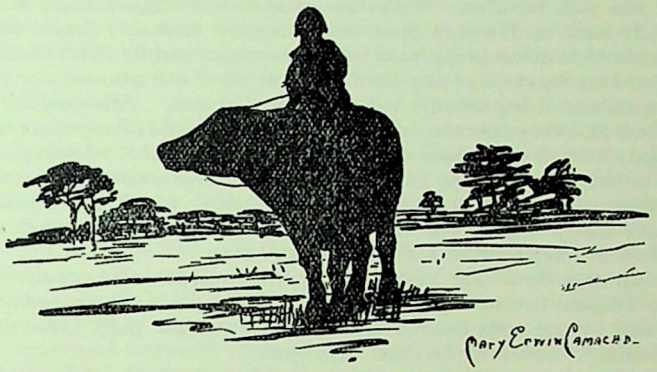
Throughout the entire Yangtze Valley and southward the chief means of travel adopted by officials, gentry and their women-folk is the chair ; while throughout the whole country prior to the revolution in 1911 each official and mandarin had his chair in which he travelled from place to place or paid calls. This, of course, was the official chair well-known to all in the days of the old Manchu *régime*, and still used in many places, though, wherever roads permit, the motor-car has taken its place. It was always carried by four men in uniform with the typical Tartar hat and button on their heads. A similar type of chair, though red in colour and gaudily decorated with gold embroidery and tassels, is used to carry the Chinese bride and bridegroom on their several wedding-day journeys. In central and south China, where travel by chair is much more prevalent than in the north, a much lighter contrivance is used, carried by only two, or, if the fare be heavy, three coolies at most, while from Foochow southward the contrivance is literally a chair of wood, bamboo or rattan, as the case may be, slung on two long slender poles, and carried by but two coolies. In the old days in Hongkong this form of conveyance was the only thing used by foreigners. It is extremely comfortable, if one has good bearers, but the Westerner is prone to feel a certain amount of embarrassment at being borne thus on the shoulders of fellow human beings.

One of the worst features about all this carrying, whether it be merchandise or human burdens, is that in many places in the south women act as the carriers. This does not occur much north of Fukien, but in that province, as well as in Kwangtung and Kwangsi, where the true native women do not bind their feet, it is the recognized thing.

In Chihli, especially in the Tientsin region, peculiar man-propelled sledges, called *Pai-tze*, are extensively used on the frozen rivers and canals during winter. The man stands with his legs wide apart on the stern of the sledge and punts it along by means of an iron shod pole operated between his legs.

We cannot leave the subject of the human beasts of burden in China without referring briefly to those who actually carry the loads on their backs. Most notable amongst these are the tea carriers of Western Szechuan and the Tibetan border-lands. These men tote incredibly huge loads of brick tea, weighing several hundred pounds, up the steep and narrow stone-paved paths from the Yangtze Valley and other tea manufacturing regions into the highlands of Tibet, where buttered salted tea is the national beverage. Theirs is a life of unending toil. The bales of tea are strapped high on their backs, and are so heavy that should they sit or slip down they would be unable to rise again. They therefore carry a kind of crutch which they use to prop up their loads when they desire a rest. Thousands of coolies are engaged in this occupation, as China's tea trade with Tibet is enormous.

Finally we have the stevedore of the treaty ports ; and here, perhaps, the heaviest loads of all are carried. During the Great War many Chinese stevedores were taken to France in the Labour Corps by the Allies, and many tales are current about the weights that some of these men used to carry on their backs. Perhaps the most striking of these is one regarding the loading and unloading of shells at the ammunition dumps, where certain sturdy coolies used to give displays of their prowess by carrying unaided the 600-lb. shells of the biggest guns on their backs from the lorries to the destined dump.



THE JUNKS, SAMPANS AND INLAND WATERWAYS OF CHINA

BY

ARTHUR DE C. SOWERBY

No account of the various means of transport indigenous to China could be considered complete without at least a short description of the various native craft, from the largest ocean-going junk down to the smallest *sampan* or punt used on the streams and side creeks of the inland waterways, and since the present issue of the *China Journal* is being devoted to the subject of transportation in China, the following short discussion of her ships and boats is included.

At the outset it must be made clear that only the briefest survey of the subject is possible. The reader who wishes to go more fully into its details may be referred to Ivon A. Donelly's delightful book "Chinese Junks and Other Native Craft," published by the enterprising firm of Kelly & Walsh, Ltd., a few years ago. This book deals with a selection of some twenty-seven different types of native vessel, which, the author considers, will serve to give the reader a fair idea of the subject, although, as he says in the introduction, "every port, every inlet and

lake has its own peculiar vessel best suited to its particular waters, currents and needs. Literally their name is legion." This might suggest that there is no such thing as standardization in native craft construction in China; but this is hardly a true indication of the case. While there are a very large number of different types of river and sea-going craft in this country, and each district has its own series of types, the builders conform very closely to those types which by long usage have become practically standardized. Another point to be made is that certain principles of form and construction are practically universal, notably the flat bottom. With the exception of the lorcha, a vessel admittedly built on Western lines, every Chinese boat and ship is without a keel, leeboards alone being used where necessary, while in all those with masts there are no stays of any kind. The type of sail almost universally used is a balanced lug usually with bamboo battens. Allowing for these main features, every conceivable shape and size of craft has been evolved, from light, narrow and shallow punts or canoes capable of carrying but a single person, to sea-going junks of three to four hundred tons draught. The largest are the great Pechili trading junks, which are fitted with five masts, carry four to six thousand catties of cargo, and are from 140 to 180 feet in length, with a 20 to 30-foot beam.

All up and down the China coast, and well into the southern seas and the Indian Ocean, Chinese junks may be seen, their picturesque shapes and brown sails fascinating reminders of the days before steam revolutionized transport on the high seas.

The Chinese are excellent sailors, and handle their junks with consummate skill, braving all conditions of wind and weather, riding out even the terrible typhoons for which these seas are notorious. It is no uncommon thing during the typhoon season, from July to September, and when coastal steamers have sought refuge under the lee of the many islands that fringe the China coast, to see Chinese junks apparently unconcernedly going about their business, or skilfully making for some port of refuge. Of course, as is only to be expected of craft of their size and without any machine motor power, terrible havoc is wrought at times along the coasts by unusually severe storms, but on the whole there is surprisingly little loss, and the Chinese sailor must be accorded a place second to none amongst those that sail the seas. Indeed, such excellent mariners are they, there is no hesitation on their part when occasion arises of setting out boldly across the ocean, and there are not wanting instances of their having reached far-distant parts. In 1848 a Foochow pole junk actually reached London, having hazarded the dangerous journey round the Cape of Good Hope, while, much more recently, another of these junks reached Sydney in 1908, while a third made its way to San Francisco in 1912.

The Foochow pole junk, so-called because it is usually employed carrying the famous Foochow pine (*Cunninghamia lanceolata*) to various ports up and down the coast, may be taken as the type of all the junks from about the mouth of the Yangtze southward, while the Pechili trader, already mentioned, typifies the northern junks. That is to say, the former has a narrow bow with two wing-like flares, one on either

side, while the latter has a square bow. The Foochow pole junk is further characterized by a very high, beautifully painted and decorated stern. The poles which form its cargo are fastened over the side in enormous bales, so to speak, giving the junk when loaded and at sea a very peculiar appearance. The holds of all these junks are divided into water-tight compartments, which adds greatly to their safety at sea.

Smaller than the trading junks are the deep-sea fishing junks, there being almost as many types as ports along the coast, while smaller still are the innumerable longshore fishing boats. Some of these are like miniature junks, others belonging more to the class called *sampan*.

Sampan, meaning "three boards," is a name universally used for small boats that cannot be classed as junks, barges, houseboats or rapids boats. These, again, vary very extensively in their general appearance and details of structure. The longshore, heavily-built boat used all along the Shantung and Chihli coasts, is called a *sampan*, as also is the small, light, high-sterned, brightly painted boat that plies for fares along the Bund at Shanghai, Foochow, Hongkong or any other port south of the Yangtze. One even hears the smaller types of native houseboat called *sampan*, so universally has the name become applied. Generally speaking, any small native craft is designated a *sampan*, and with that the average Westerner is satisfied. But even the most cursory observations will reveal the fact that just as there is an almost unlimited variety amongst the sea-going and coastal craft of China, so there is an unbelievable number of types of craft plying upon the rivers, lakes and canals of the interior.

On the Min River, for instance, in Fukien, there are what are called "rice boats" and "sparrow boats." These are specially constructed with narrow bows and stern, for going up and down rapids, the former with cargo, the latter with passengers.

Throughout the creek-intersected areas of Kiangsu and Chekiang a long, narrow, almost canoe-like craft is used expressly for fast passenger services. These may be propelled by a man in the stern working two oars, one with his hands and another with his feet, something altogether unique in the art of rowing, or by as many as three *yuloh* or stern sweeps worked from right to left. They travel at great speed, for native craft, and are used to carry passengers from the villages to the towns and markets and back again. Early in the morning their owners may be heard blowing their conches as they signal to the villagers that they are ready to start, and in the evening they may be seen bringing the same villagers and country-folk back to their homesteads.

The *yuloh*, be it mentioned, may be considered the supreme invention of the Chinese in regard to inland water shipping, for it is the most efficient man-power method of propelling a boat. It may be described as a long, heavy oar composed of two parts, the blade and the handle, spliced together in such a way that they form a very wide angle. About half-way up the blade is a socket which fits on to a knobbed iron peg in the stern of the boat, the blade dipping into the water behind the boat, and the end of the handle being looped or hooked to a rope which is fastened to the side of the boat. By moving this oar to and fro from right

and left, and imparting a certain twist at each stroke, a single coolie can drive a heavily laden *sampan* through the water that would take several men to row or paddle in the ordinary way, while a crew of three or four can manipulate the largest barge fully loaded. The *yuloh* is a marvel of efficiency, and the only wonder is that it has not become universally adopted outside of China. In China it is everywhere used, except in swift rivers. Its only drawback is that it is not fast, which, of course, renders it useless against swift strong currents. Other methods extensively used by the Chinese are tracking and poling. They are past masters at the latter.

Longer journeys are usually taken in native houseboats, which are really very comfortable and comparatively fast, especially if there is a wind and sailing is possible, for they are all fitted with tall masts and big lug sails. These craft range in size from a little more than a *sampan* up to boats of 50 feet or more, some capable of carrying cargo as well as passengers, and, plying on the large rivers, almost equal junks in size.

Then, of course, there are all the numerous cargo-carrying river boats that may be designated as barges, and these are the main carriers of produce wherever water transit is to be had. Even amongst these there is a great variety of form and structure, far too great to be described here. Donelly's book describes some of these, but only a comparatively few.

In out-of-the-way districts various peculiar and unusual types of craft are used. For instance, throughout Manchuria a dug-out canoe is used This has been introduced by the Koreans, who have settled extensively in this part of the country. Manchurian rivers are als navigated by a kind of craft in many ways differing from thoseo of China Proper, and called *wei-ho*, while on the Yellow River, from about Ninghsia in Kansu to the point where it debouches from the mountainous and hilly regions of South Shansi on to the plains of East China, a very roughly-built scow is used. This type of craft is built at various spots on the northern loop of the Yellow River, and can only be used to carry cargo down stream, the river being too swift and full of shoals to allow navigation by ordinary boats upstream. They are built of narrow boards cut from the small and crooked willows that alone will grow in these desolate regions, and show an extraordinary amount of ingenuity on the part of the builders in the piecing together and rivetting of the crooked planks. At the end of their journey down river these barges are sold and broken up for firewood. There is one place on this river, where it runs between Shansi and Shensi, where some formidable rapids and a very considerable waterfall occur, and here these scows are unloaded, and lowered empty by means of stout ropes down a series of rapids that mark a small détour of the main stream, the cargo being carried on land to a point below, where it is placed on board again.

In places in the vicinity of Hangchow the canals are at different levels, and to get boats from one level to another an ingenious mud slide is used, the boats being drawn up or lowered by means of a heavy hauser wound on to rough capstains on the bank.

Just as there is a great variety of craft that sail the waters of China, so there is a wide diversity amongst the people that use them. It has many times been noted what an immense river and canal population there is in this country, literally millions of individuals being born, living and dying upon their boats. Particularly noticeable is this from Shanghai southward. Indeed, in Fukien Province there is what may almost be called a race of people—certainly more than a class—who literally have no rights on land. They are called the river people, and their women wear a dress distinctive from those of the other women ot the province, especially in the matter of pantaloons and the way they do the hair.

On the creeks and canals of Kiangsu and Chekiang there is a class of boat-livers that may almost be called water gypsies, living, as they do, vagrant lives upon their wretched little boats, and earning a precarious living when and how they can, stealing, fishing, occasionally carrying cargo, but mostly acting as scavengers. Hundreds of these people may be seen in the side creeks of the Whangpoo in the vicinity of Shanghai.

China is not lacking in regular marine fishermen, as may be gathered by the number of fishing junks and *sampans* to be seen along the coasts, while, for all we are living in the 20th century, numerous pirates still infest the China seas. Many a grizzly tragedy is enacted upon the China seas, and there are certain parts of the coast known as pirates' strongholds. Bias Bay, on the south-east coast, is, perhaps, the most famous of these, by reason of the fact that the pirates from this roost have several times of late years attacked and actually captured steamers, taking them to Bias Bay and there looting them and carrying off passengers for ransom. Other places are Tsung Ming Island, in the Yangtze Estuary, and the sea coast from Taku, at the mouth of the Hai Ho, near Tientsin, northward. In the villages of the hinterland of this latter region it is surprising what valuable commodities, rich silks, clothing and the like, may be purchased at low prices. They are the loot of the sea. The Chinese pirate is not a thing of the past. He is as active as ever, but with the passing of the foreign sailing ship his activities, with certain desperate exceptions already alluded to, became confined to native craft.

The inland waterways of China, as may have been gathered from the foregoing remarks upon the numerous craft that ply upon them, are of extreme importance to the country. There are many great rivers, forming natural water highways for the transport of commerce, the most important being the Yangtzekiang, whose basin occupies about half of China Proper. Other important rivers in this connection are the Pei Ho in Chihli, and the Sikiang, or West River, in the south. These are supplemented with canals, in the construction and maintenance of which the Chinese have in the past shown themselves very apt. Of these canals the most important is, of course, the Grand Canal, one of the wonders of the world. This connects Peking with Hangchow, and is 1,200 miles in length, having been designed mainly for the carrying of tribute rice in the old imperial days. The first part of this canal, between the Yellow River and the Yangtzekiang, was constructed in the Chow Dynasty, about B.C. 485, the section from the Yangtze to Hangchow in the Sung Dynasty, and the final part from the Yellow River to Peking

by Kublai Khan. The most important system of canals occurs in what may really be looked upon as the Yangtze Delta, the flat alluvial area of Kiangsu and North Chekiang that lies to either side of the Yangtze mouth and extends as far south as the estuary of the Chientang River at Hangchow. This whole area is cut up to a perfectly astounding degree by canals, creeks and ditches, is mainly tidal, and carries an enormous boat traffic. Every village and hamlet in this whole area can be reached by water, it being merely a question of the size of the boat. There must be a total of many tens of thousands of miles of waterway in this area. The Whangpoo River, upon which Shanghai is situated, runs through this vast system of canals and creeks, and is the main source of supply of the water that fills them. The tide, rushing up at great speed, is felt well over a hundred miles up its course, the waters coming down from the hilly country of North-west Chekiang and South-west Kiangsu, backing up for a considerable distance further inland.

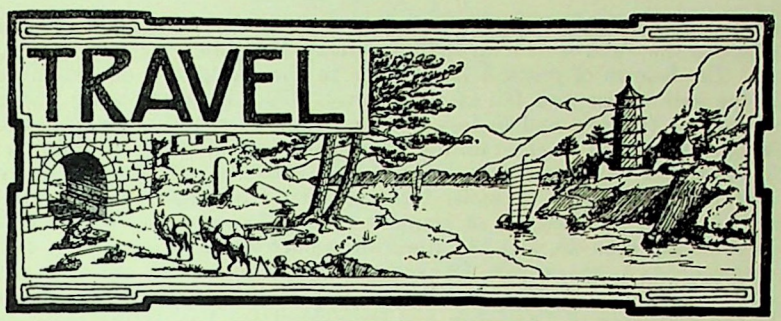
The Whangpoo is actually a tributary of the Yangtze, which, in turn, is China's chief water highway, being navigable for ocean-going steamers as far as Hankow, 600 miles up its course, while other steamer traffic can go as far as Suifu, in Szechuan, 1,630 miles from the mouth.

The Huang Ho as a navigable river is not worthy of consideration, being shallow and full of shoals and sandbanks from its mouth up to the point where it emerges from the mountains of the interior, and swift and treacherous from there up to its source. A certain amount of boat traffic occurs over limited sections, but nothing of very great importance.

The Pei Ho,* on which Tientsin is situated, may be considered a poor replica of the Whangpoo, the inland shipping of Chihli being very similar to that of the hinterland of Shanghai. But, owing to the excessive amount of silt carried by the Yung-ting Ho, one of the tributaries of the Pei Ho, the latter has been giving an enormous amount of trouble lately by becoming silted up and too shallow for the usual steamer traffic.

The Chientang, Min and other rivers of South-eastern China are important as commerce and produce carriers, while the Sikiang, or West River, in the south does what the Yangtze does for the central areas, tapping the rich provinces of Kwangtung, Kwangsi, and neighbouring parts of Hunan and Kweichow, bringing their produce down to Canton and the important harbour of Hongkong. The importance of rivers and other inland waterways to China will be realized when we note that from Canton northward to Shanghai all the treaty ports are fed as to trade from the interior by rivers—Swatow, Foochow, Wenchow, Ningpo and Hangchow—while the most important treaty port in the north, Tientsin, is similarly fed by a river system. Newchwang and Antung, important ports in South Manchuria, are also fed by large rivers, the former by the Liao and the latter by the Yalu. The greater part of Manchuria is drained by the Sungari River, an important tributary of the Amur, and its tributaries. This river is navigable for light-draught steamers from its mouth as far as Kirin city, and from there a further hundred miles or so by Chinese craft. It carries a very considerable traffic, which is steadily increasing as the country develops.

* The lower part of this river, from Tientsin to the mouth, which alone is navigable for steamers, is called the Hai Ho.



TRANSPORTATION ON THE YANG-TZE KIANG

BY

H. FOOTE CAREY

Strictly speaking, this is not the correct name for the river. The natives are parochial in their habits, and different localities have different names for it, and though among foreigners the name "Yang-tze" has been generally adopted, this really refers to only a small portion of the river in the vicinity of Yangchow.

The Yang-tze is only navigable for about half its length, namely from Pingshan Hsien, in Szechuan, to the sea, a distance of 1,620 miles, but nearly all of its numerous tributaries are also navigable, and some of them are of great length and size. The area of the navigable part of the basin extends through some 8° of latitude and 18° of longitude, comprising about 520,000 square miles of what is probably the richest soil in the world; and, since by far the greater part of it is workable, the produce must be immense. Yet throughout it roads, as known in Occidental countries, are practically unknown, and the only means of communication are by the innumerable waterways.

Like all river basins it is hilly or mountainous on the margin towards the watershed, and flat towards the middle or main bed. On the margins all the streams have the usual characteristics of mountain streams, rapids and swift currents, which render the navigation of them difficult, though in most cases feasible, while the main bed is really comprised of a chain of lake basins which have been more or less filled up by silt from the various streams, and it now consists of innumerable lakes and lakelets joined by an intricate net-work of creeks and canals extending from Shasi to the sea. In this area navigation is easier, though handicapped by shifting channels.

Undue stress should not be given to the main stream, for in many cases tributaries discharge nearly as great a volume, notably the Ya-lung, Min Ho, Chia-ling and Han Ho. At Hankow, where all streams

converge to one channel, a rapid rise of the main river at Ichang has less effect on the water-level than on its tributary, the Han.

The feature of greatest importance to the navigation of the river is the annual rise and fall of water-level. This is large, being about 40 feet at Hankow and 70 feet at Chungking. Generally speaking, the water-level is at its highest during August and at its lowest in February. There appear to be some very childish notions current as to the regularity of this rise and fall. Actually there is much irregularity both in the amounts and the time, for at Hankow the height may vary by ten feet more or less than 40, and the times of occurrence may vary by two months. As a general rule, Hankow is " open " for ocean steamers for some eight and a half months in the year, from the middle of March to the beginning of December, and Chungking for the larger class of " upper-river " steamers about the same period.

Transport, both freight and passenger, is effected by two methods, native and foreign. The native method is by the many types of native-designed craft, which are mostly wind-driven, and rafts, of which the larger types merely drift with the current and so are seldom seen below the limits of the tidal current. Foreign transport is by steamer, that is, vessels propelled by machinery, whether steam or internal combustion, and the design of these vessels is entirely Occidental. Many foreign craft are, however, owned and operated by natives, and some native craft by foreigners.

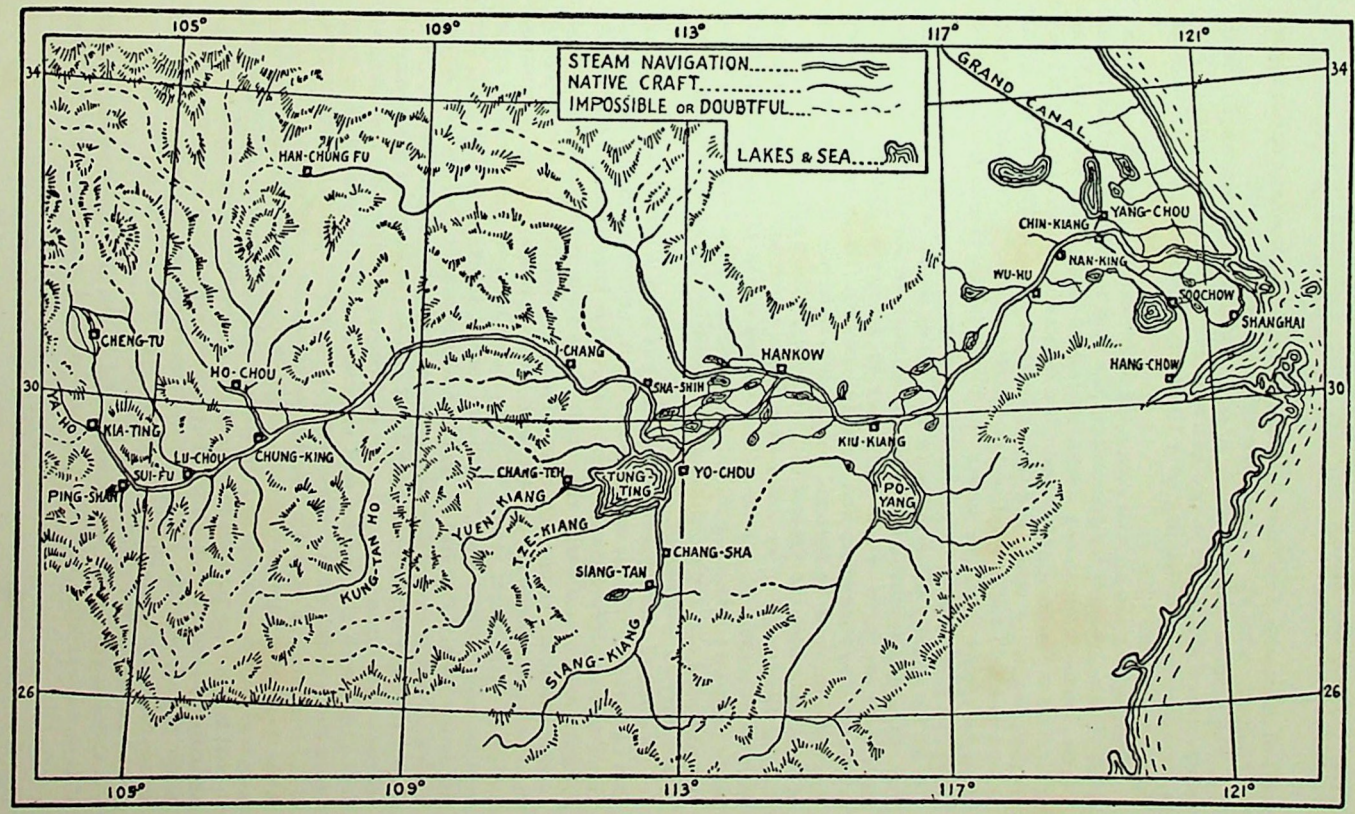
Native transport is mostly designed for service on the river, and, owing to the numerous different conditions prevailing, is correspondingly varied. There are also a few sea-going junks to be met with, though these usually only penetrate short distances.

The sea-going types are few, principally the " Ningpo " junk with its wide-winged bow and watchful eye on either side, and the curious " turret-deck " junk with its low hull and five irregularly disposed masts. These are usually seen only on the estuary, and rarely further than Chinkiang.

A remarkable type is the lorcha, which, strictly speaking, belongs to the foreign type of craft, for it has a foreign hull but Chinese rig, three-masted. Before the introduction of steamers foreign commerce on the river was carried on in small schooners, where, as native crews replaced the foreigners, the advantages of the Chinese rig, which was thoroughly understood by them, soon became apparent. The persistence of the foreign hull is undoubtedly due to the greater robustness of this design, as the Chinese junk is relatively very flimsily built. The lorcha is still in use between Shanghai and Hankow, which trade its parent type, the schooner, was brought out to serve.

In the estuary transport falls mostly to a type of native-owned small steamer, which, owing to the quantity of poultry they carry, are known as " chicken boats "; and native transport is restricted to ferrying, which is done by small undistinctive single-masted craft, sometimes known as " drag boats."

At Chinkiang one meets two very interesting types, the salt junk, or *kuan chuan*, and the jointed canal boat. The salt junk is a lordly



Map of the Yang-tze Basin showing Navigable parts of the River and Tributaries.

craft of great size, two-masted, stoutly built, with spacious cabin space, very popular with the former Mandarins for travelling in.

The jointed canal boat is a small, shallow, light-draught boat, designed as a single hull in two halves which are lashed together. This is for convenience in hauling over the weirs which constitute locks on the Grand Canal.

Throughout the alluvial area a small two-masted type is very common. These are used for penetrating the vast network of canals to the inland towns, and among them, as indeed among all river craft as distinct from sea-going junks, there is a noticeable feature, the relatively greater height of mast and narrowness of sail. Owing to the great annual rise and fall of level on the inland waterways, the banks would often be higher than the masts, and the boats would be becalmed except at high river if they had short masts.

In the vicinity of the entrance to Poyang Lake, what is called the Poyang junk is encountered. This is also curious, for though the lower-river craft are more or less rectilinear in plan, the Poyang Laker is relatively sharp stemmed and very full bellied. It is said that they very often have to lie aground on the mud flats, and that this sinuosity of form expedites the process of "wriggling" them off again.

All the foregoing, or lower-river types, are relatively heavily built craft, suitable enough for the placid waters of the alluvial plains, but, as we progress towards the mountainous regions, with stronger currents, violent eddies and rapids, either greater motive and manœuvring power is necessary or less weight.

The first of these types to be met with is what is known as the Tungting Lake junk. This is small, lightly built, and can readily be distinguished by its upturned gondola-like stern. It is the "*Shen po-tzu*" of A. J. Little, and contends with the rapids of the Yuen Kiang and Tze Kiang.

On the lower river the timber-rafts are encountered. For steamers these constitute one of the greater perils, and fortunately can only progress during the high-water period. They consist of pine poles, made up in sections, some 40 feet wide, which are lashed together end-to-end, and frequently exceed 300 feet in length and draw 13 to 16 feet of water. Thus they often exceed the displacement of large ocean steamers, and should they get out of control and fall across the stem of a steamer at anchor would cause endless trouble and damage. Actually they merely drift down with the current and are manœuvred by means of a very clever though somewhat inefficient system of anchors, so that getting out of control must be almost a continuous occurrence with them. During latter years the number of floating aids to navigation has been greatly increased, and the damage by rafts to such aids correspondingly increased, so that it has been possible to enforce the employment by them of tugs. Actually to control such an unwieldy mass would need an exceedingly powerful tug, and the trifling native-owned steam launches hired for the purpose are somewhat ineffective; still, the effects of the enforcement have been very satisfactory.

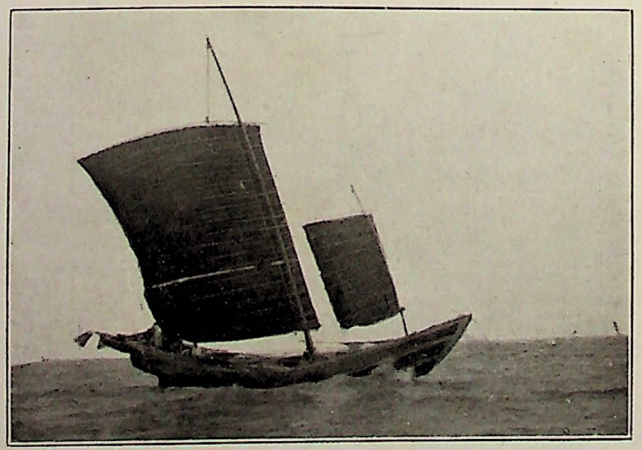
Quite a feature of the timber-rafts is the semi-permanent village built on each of them, and it is amusing to see a regular village drifting



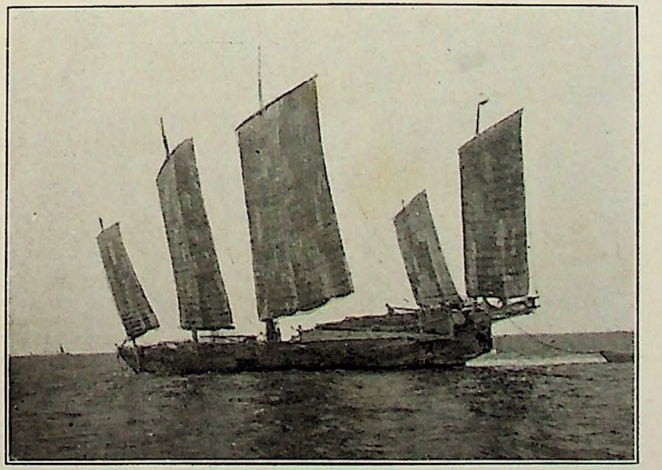
A Foochow Trader.



A Ningpo Junk.

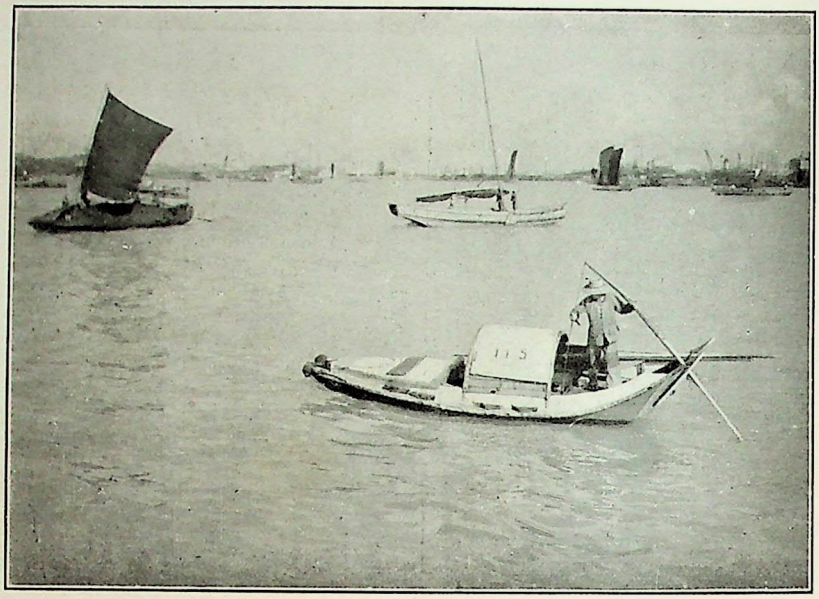


A Tsung Ming Island Fishing Junk.



Photos by Mactavish, Shanghai.

The Five-masted Pechili Trader.



A Small Sampan on the Whangpoo.



Photos by Mactavish, Shanghai.

Native Boats on the Whangpoo.



Barges and Sampan Traffic on Siccawei Creek, Shanghai.



Photos by Mactavish, Shanghai.

Water Gypsies of China, Kiangsu.

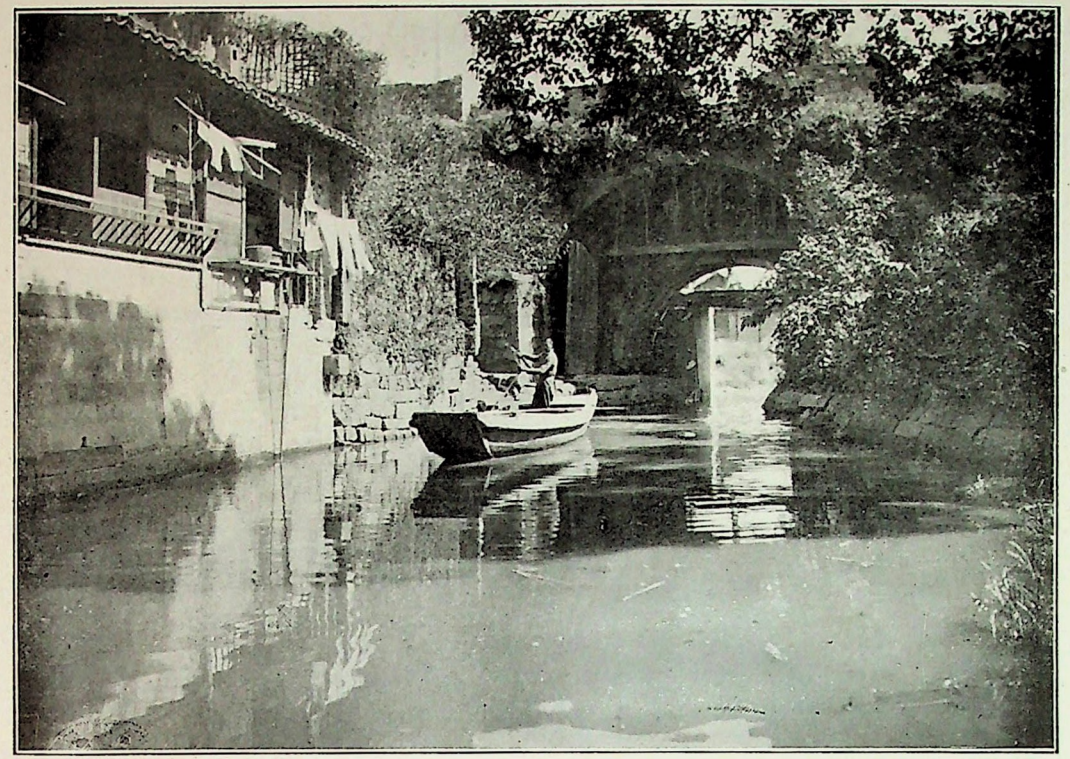
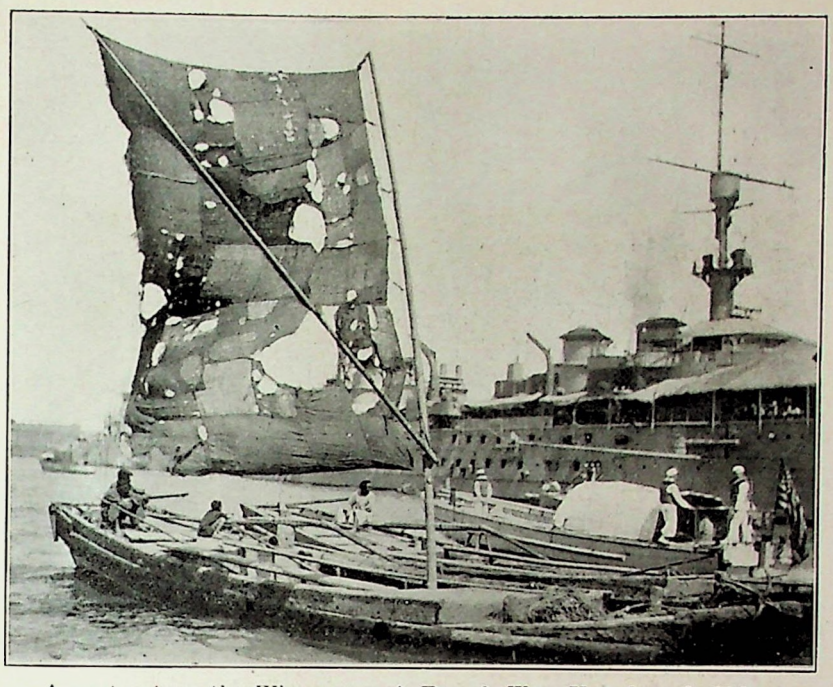


Photo by Donald Mennie.

One of the many picturesque inland Waterways of China. The Watergate at Sungkiang to the South of Shanghai, Kiangsu.



A contrast on the Whangpoo, A French War Vessel and Chinese Barges. Note the Sail of the latter.

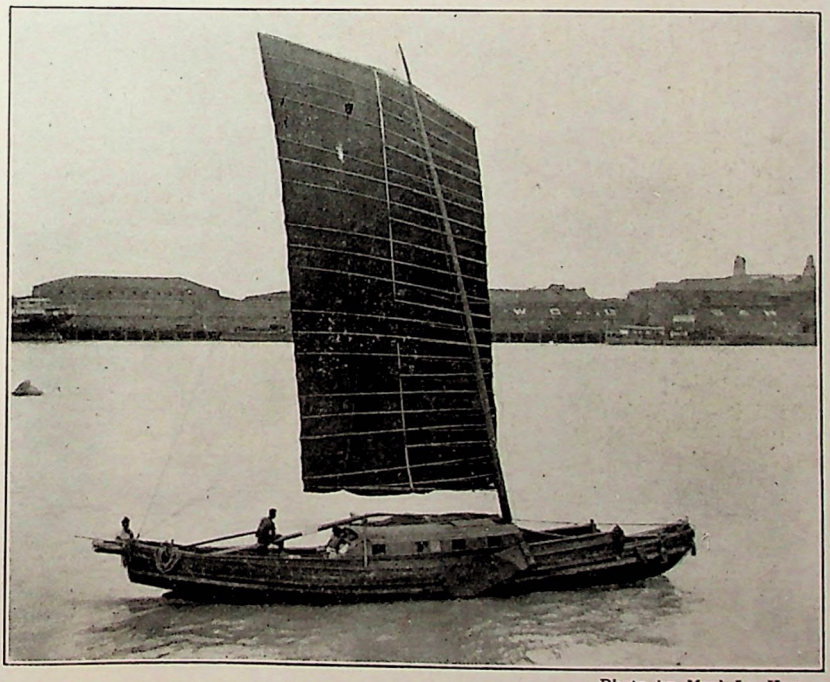
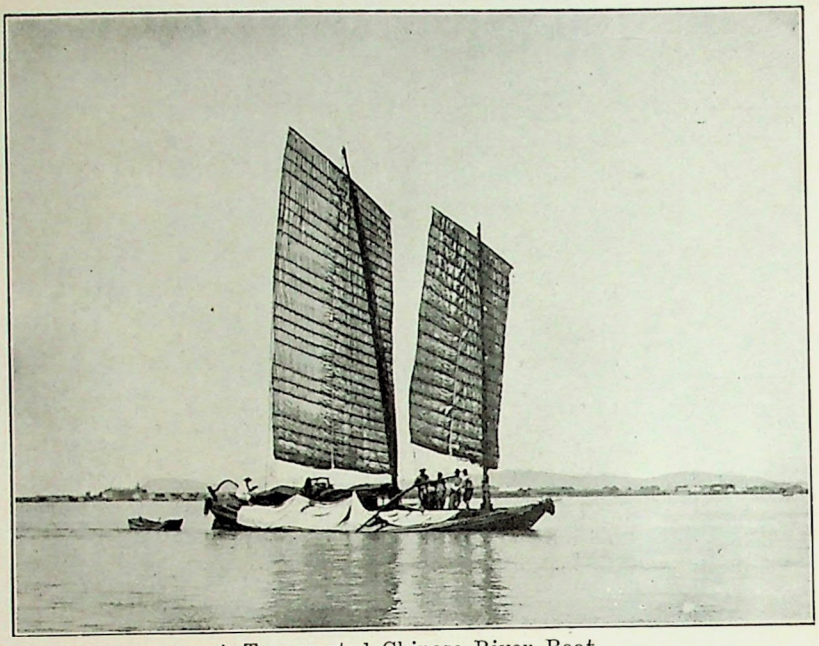
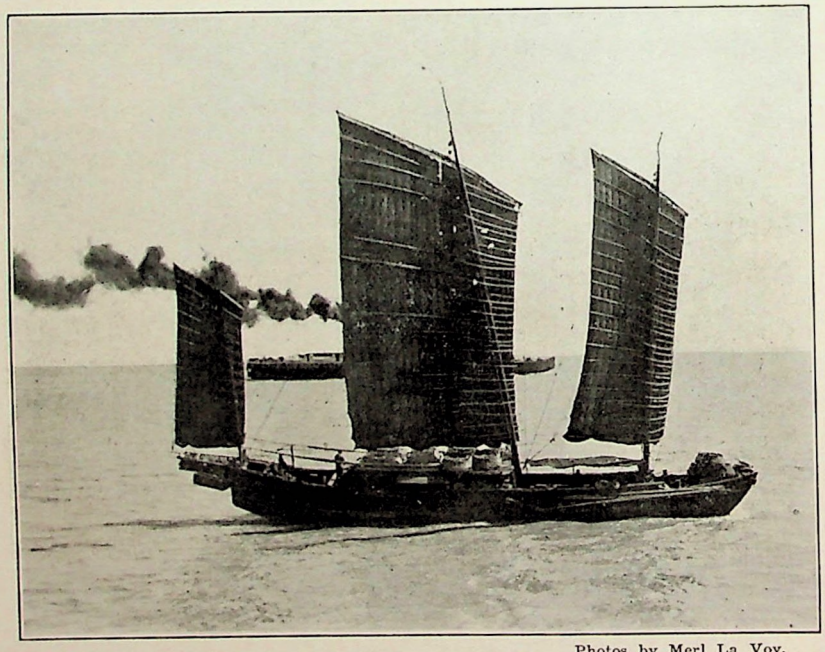


Photo by Merl La Voy.

A Chinese Houseboat on the Whangpoo. Note the tall Mast and big Sail.



A Two-masted Chinese River Boat.



Photos by Merl La Voy.

A Three-masted River Junk putting out into the Yangtze Estuary from Woosung at the Mouth of the Whangpoo.

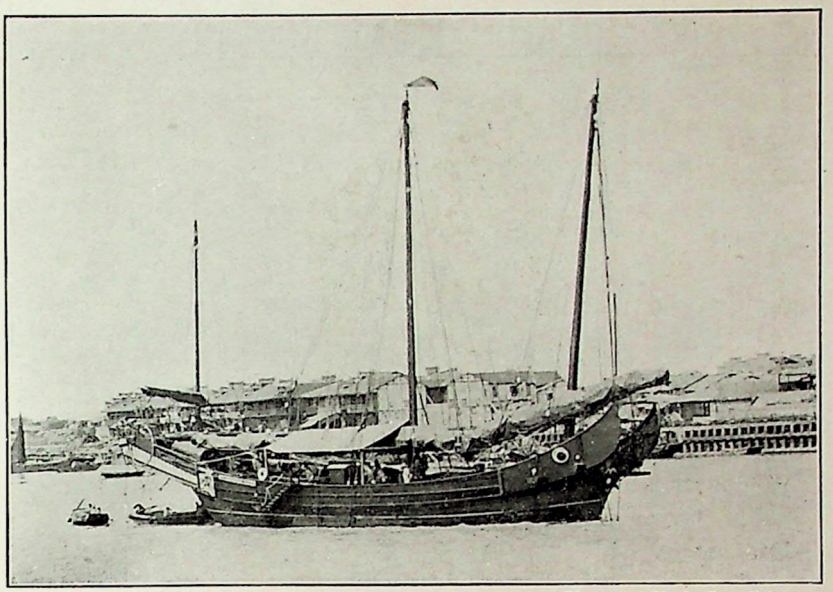
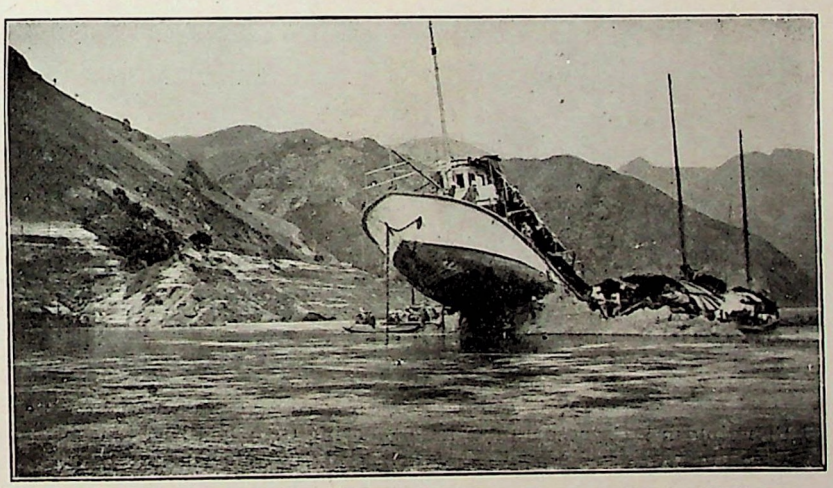
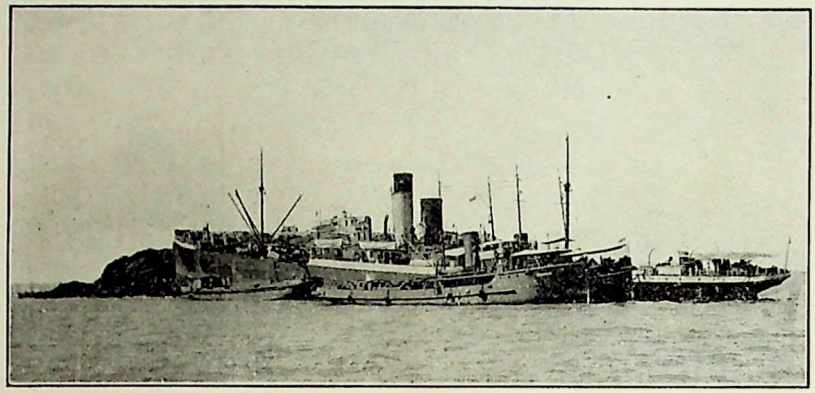


Photo by Clark Expedition.

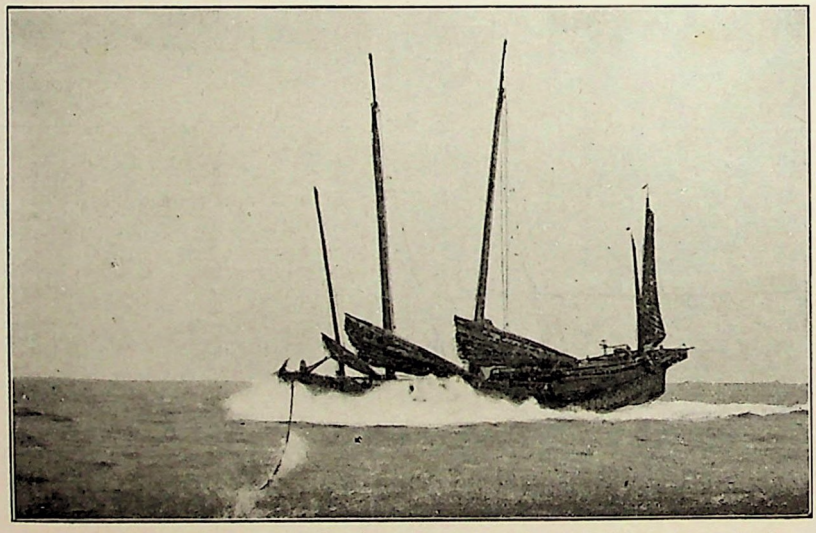
A Chinese sea-going Junk at Hankow on the Yangtze.



What may happen on the Yangtze. A French Gunboat that has run on a Rock and been left in the Air as the Water in the River fell.



The "Pakling" which went aground on Button Rock outside the Yangtze Mouth and was salvaged by the Shanghai Tug and Lighter Company. Note the Company's Tugs alongside.



Bringing in a Chinese Junk whose Steering Gear had been smashed. This Junk was loaded with Sycee and Silk, a rich haul for Pirates. She was rescued by the Shanghai Tug and Lighter Company.

towards one, replete with pigs, chickens and dogs, and occasionally with goats.

The timber comes from the remains of forests in Hunan and Kuei-chow, and is reported to be three years in transit. It has to wait up country for the annual rise of the rivers down which it is brought in small rafts, but cannot get out of the Tungting Lake before the following low-water, and lies on the mud till the next year, when it is taken to Hankow, where it is actually sold and may lie indefinitely. Lower-river dealers purchase their timber in Hankow, make it into these big rafts and bring them down to their ultimate destination. The big rafts are not brought into the region of the tidal stream. The lowest point at which they are broken up is at K'ou-an, about 130 miles above Wusung.

At Ichang and upwards types of native craft completely change, for at this point the worst section of gorges and rapids on the upper river commences. They are all relatively more lightly built and use a bow sweep to augment the steering power of the rudder. The principal types are the cargo junk, passenger junk, *wu-pan*, and the *hua-tzu* or *sampan*.

The cargo junk of the upper river is a noble craft. It is capable of carrying some 50 tons of freight, and, in order to compete with the ordinary river current, requires a crew of up to 70 men, which at bad rapids require the assistance of two or three hundred more. The 365 miles to Chungking usually take six weeks to accomplish, and it has been computed that ten per cent. of the freight and lives of the crew are annually lost in the process. From which the reader may form his own conclusions of the difficulties of navigation.

The passenger junk, or *hua-tzu*, is a smaller and lighter edition of the cargo junk with increased cabin accommodation. Both of these have deck-houses on the after part. The *wu-pan* has no deck-house and is a still smaller craft with a crew that seldom exceeds fifteen in number.

The Chinese Post Office evolved still another type which is used exclusively by this service. It is a large *sampan* with a cabin which is more or less water-tight to protect the mails from rain and the spray of the rapids. They have a blue and white sail.

There are three other types on the upper river, but only used in their respective localities. Two of them are coal boats. Immediately above the Mi-tsiang gorge is a small affluent called the Hsiang-ch'i, a short distance up which is a seam of passably good coal, and to bring the latter down this very swift stream a small *hua-tzu*, built very like a Canadian canoe, with upturned stem and stern, is used.

Above Chungking there are many coal mines. From the one at Ping-shan Hsien it is brought down in a flimsily-built type of *wu-pan*, purposely poorly built of inferior timber, so that on arrival at its destination it can be broken up for firewood. This saves the trouble and expense of hauling the craft up river again, the strain of which, indeed, it would not be likely to stand.

Very different to this is the *wai-piku*, or twisted-stern junk, that has been evolved to meet the very violent eddies of the Kung-t'an Ho, which joins the Yang-tze at Fu-chow, Szechuan. This is stoutly built,

of less length than the cargo junk of the main stream, and has one side of the stern raised much higher than the other. On the horn of this is swung a large sweep, which is worked from a 'thwartship bridge near the mid-length, while there is a smaller sweep on the lower horn worked from aft. There is, in addition, a bow sweep.

Flowing into the Min Ho at Kia-ting is the Ya Ho, a mountain torrent too short and dangerous for hulled craft. The lower reaches of this are navigated by rafts about 50 or 60 feet long, made of bamboos about five inches in diameter. At intervals are fittings for oars, and between them small amounts of cargo are carried. They are occasionally seen as far down as Lu-chow.

The *hua-tzu*, or *sampan*, is ubiquitous on the Yang-tze, and, on the whole, the type varies very little ; but it must not be confused with the Shanghai *sampan*, which is unique.

Foreign transport is of two classes, sea-going craft and those designed to meet the special conditions that occur on the river. Of the sea-going vessels there are two main classes, ocean-going and " coasters," and the difference between these is simply that the ocean-going vessels are larger than the " coasters." All the sea-going vessels are essentially cargo vessels, for the passenger traffic is almost entirely in the hands of the river-craft. There is nothing distinctive among the sea-going vessels except that some of them are tank steamers employed in the extensive trade in kerosene and petroleum products, and also occasional refrigerating vessels for the egg products and meat traders.

River-vessels are all of lighter draught and construction than sea-going craft and are far more varied in type owing to the more varied conditions they meet. Broadly, they are in two classes, low and high powered, the first of which are used in the delta and alluvial regions, and the latter in the higher reaches among the rapids and swifter currents. And each of these again are of larger and smaller types to suit the different channels they are designed to navigate.

The estuary is served by a small type of low-powered steamer which has been nick-named " chicken boat," whose region extends to Yang-chow by a branch known as the Sien-niu Miao Ho. Some of these are indeed old " Hankow boats," but as experience of the river has been acquired larger vessels have been built.

The region from Shanghai to Hankow is served by the larger type of low-powered steamer, and there are many very fine vessels among them. They have a loaded displacement of up to 4,000 tons, and are well fitted for passenger traffic of several classes, from their luxurious saloons to the native deck or coolie passenger. They are known as " Lower River " steamers.

Beyond Hankow, though 10,000 ton ocean steamers can reach Yochow, the channels become narrow and smaller, and the smaller type of low-powered river steamers connect that port with Ichang and with Changsha and Siang-t'an on the Siang-kiang. They also cater for the different classes of passengers, though their size militates against their being as luxurious as the larger vessels. These are " Middle River " steamers.

All the alluvial regions are also served by fleets of tugs and lighters. These lighters are both of the dry-goods type and tank-lighters which have been developed for the wood-oil and kersosene trades. Also the alluvial regions are served with a native-owned passenger service of small launches that call at small towns and villages not served by the larger vessels. This extends not only on the main river from Chinkiang to Ichang, but up all the numerous tributaries and creeks where navigable, notably in both the Poyang and Tungting Lakes and up the Han Ho.

The section above Ichang is known as the "Upper River," and is navigable up to Pin-shan Hsien, but through lack of inducement the actual head of steam navigation is at Sui-fu, 565 miles from Ichang. It is at the junction of the Ming Ho which flows past Chengtu and Kia-ting, and steamers ascend the 97 miles to the latter port. The Chia-ling Kiang joins the main stream at Chungking, and its practicability has only lately been utilised by steamers that now ascend it to Hochow, a distance of 40 miles.

Only high-powered steamers can be used on the Upper River, and of these the larger types are impractical during the low-water season, though at high levels they have been used up to the limit at Suifu.

Generally they are used between Ichang and Chungking, and the smaller types upwards and on the tributaries, but at low levels even the smaller steamers cannot use the upper channels, and they then usually replace the larger ones on the Ichang-Chungking section.

In addition to these types there are large numbers of "harbour launches" in use at the various ports, and an adaptation of this type of craft, larger and fitted with permanent dwelling accommodation, used by the River Inspectorate of the Chinese Maritime Customs, the Yang-tze River Commission and the Salt Gabelle, are to be met, all of which in their respective spheres are connected with transportation.

Each of these many types of craft is especially suited and necessary for the special conditions under which it operates, and from this short description it can be seen that the problem of transportation over the whole Yang-tze Basin is one of no little complexity.

HARBOURS AND CONSERVANCY WORK IN CHINA

On the whole China is well supplied with good harbours, although the fact that most of the chief ports are situated some way up the estuaries of rivers is not all that could be desired, calling, as it does, for extensive conservancy work to maintain clear channels and an adequate depth for shipping. Thus the ports of Canton, Foochow, Shanghai and Tientsin are forced to maintain conservancies, without which they would soon deteriorate and lose their importance.

Open harbours exist at Hongkong, Amoy, Santuo, Tsingtao, Weihaiwei, Chefoo, Chinwangtao, Port Arthur and Dairen (or Dalny,) in all of which places more or less extensive harbour works have been undertaken. At Newchwang and Antung in South Manchuria, both situated on the estuaries of rivers, a certain amount of conservancy work has been done, the same being the case with the river at Swatow.

Shanghai is the most important port in the Far East, if not in the whole of Asia, having as its hinterland the five hundred thousand or so square miles of the Yangtze Basin. It lies a few miles up the Whangpoo River (Huangpu) which empties into the Yangtze Estuary, and is accessible to all but the very largest ocean-going steamers. Vessels of twenty thousand tons can sail up to Shanghai, turn and berth at one of the numerous wharves, although opinion is divided as to whether such large ships should not remain outisde the Whangpoo and discharge their cargoes and passengers into lighters and tugs, respectively.

The Whangpoo Conservancy is responsible for maintaining a clear channel and generally carries on dredging and other improvement work. The harbour at Shanghai consists of a stretch of about nine miles of the river. Excepting a comparatively small section on the left bank, which constitutes the Bund and forms the waterfront of what was once the British Concession, before what is now known as the International Settlement was created, the banks on either side of practically the whole of this stretch of the Whangpoo consist of wharves with here and there a dock. Besides this, buoys are anchored down the middle of the river the whole length of the harbour, at which ships may lie without interfering with traffic. This means that there is accommodation for an enormous amount of shipping, and the reader may be referred to the Customs Annual Report for statistics as to tonnage entering and leaving the port. Above the port limits there is ample depth and room for shipping, and it is here that ships making a long stay, or that are laid up for any reason, take up their positions. Details of the "Port of Shanghai" may be had from the publication of that name issued by the Whangpoo Conservancy Board.

The port is well served in the matter of lighters, tugs and salvage vessels, the most important organization for this being the Shanghai Tug and Lighter Company, managed by Wheelock and Company. This concern has always done excellent work in going to the relief of vessels in distress and in salvaging operations. It possesses a fleet of 113 lighters ranging from 50 to 500 tons capacity, including tank barges and insulated lighters to handle cold storage cargo. The company also has four salvage and rescue tugs, four passenger tenders and tugs (combined service), three harbour tugs for plain towing, eight small tugs or launches for towing lighters and two fast motor cruisers. To complete its service the company has eighteen motor vehicles—lorries, tractors and heavy duty trailers—and a travelling motor crane.

Other companies engaged in cargo carrying and distributing in the port are D. G. M. Aronovsky and G. E. Marden & Co.

Tientsin, the most important port in the north has always experienced a great deal of trouble in dealing with the prevailing conditions of the

river on which it is situated. From Tientsin to its mouth, this river is called the Hai Ho, and is looked after by the Hai Ho Conservancy. Above Tientsin it is called the Pei Ho, and is under the charge of the North China River Commission. Of late years, owing to the excessive quantities of silt brought down by the Yung-ting Ho, one of the tributaries of the Pei Ho, the channel in the Hai Ho has become more or less blocked to steamers, even of the smaller sizes, and all efforts to rectify this have so far proved abortive. According to the latest reports, a party of engineers has set out to investigate the possibilities of creating a settling basin for the Yung-ting Ho, so as to reduce the silt that enters the Hai Ho. At a recent meeting of consular officials, prominent business and shipping men and the members of the North China River Commission, which took the place of the defunct Chihli River Commission, very extensive plans were announced by the latter for conservancy work on the Pei Ho system with a view to improving conditions on the Hai Ho. The estimated expenditure, including the Kuanting detention basin scheme, was given as $4,513,000. A bond issue of $4,000,000 has been sanctioned by the Government. It is high time something was done, for the situation is serious, since Tientsin's prosperity depends mainly upon its shipping trade. At present all steamers have to lie outside the bar at Taku, and must unload their cargoes into lighters, which are then towed up to the Bund at Tientsin. This work is done by the Tientsin Tug & Lighter Company, a long established organization, which, under the able management of Mr. W. T. L. Way, has contributed greatly to the prosperity of the treaty port.

Hongkong Harbour is one of the most beautiful in the world, and, like Chinwangtao and Dairen, is well fitted with docks, while there is ample room in the harbour for all classes of vessel to lie safely at anchor, excepting when, as occasionally happens, a typhoon strikes it. One such catastrophe occurred at Hongkong in 1906, resulting in an appalling loss of life and damage to shipping.

Probably the finest natural harbour on the China coast is that of Tsingtao, which was first opened in 1897 as the result of the murder of two German missionaries in Shantung. The action of the German Government in securing this harbour and adjacent territory was mainly a countermove to the activities of other European powers in securing bases on the Chinese coast. Enormous sums of money were spent, and a very fine town and harbour facilities established. The whole area fell to the Japanese early in the world war in 1914, subsequently being restored to China at the Washington Conference in 1921-2.

A port that some day must assume great importance is Haichow, situated on the Kiangsu coast north of the Yangtze Estuary and south of Shantung, since it forms the terminus of a railway system driving through Central China ; while the proposed harbour of Hulutao, situated on the South Manchurian coast about half way between Chinwangtao and Newchwang, may eventually become of considerable importance.

THE MOTOR ROADS OF CHINA

As with the railways, the motor roads of China constitute so extensive a subject that it is impossible in the space at the writer's disposal to give more than its most salient features and a few of the more important statistics. Ever since the inauguration of the National Good Roads Association of China in 1921, popularly known as the "Good Roads Movement," great activity in the planning and construction of new motor highways has stirred the various governments, provincial and national, in this country. This movement itself was mainly the result of the activities of the American Red Cross in 1920 in devising and carrying out road construction schemes for the alleviation of distress in various famine stricken areas.

Previous to this, as the result of persistent representations to the Central Government on the part of Lo Kou-shui, the then technical secretary and advisor to the Ministry of Communications, to construct motor roads as a subsidiary to the railway construction programme in hand, a presidential mandate was issued in 1919 giving regulations for the construction of new roads. But this had done little to stimulate active road building. Naturally, the political disturbances and civil wars that have racked this country in the interval since the "Good Roads Movement" was started have greatly interfered with road construction, and many of the plans evolved have remained on paper only. This can be seen by a comparison of the details of projected motor roads with those already in existence. Every province now has its official "Roads Bureau," and these have prepared extensive programmes for road construction, but the fact remains that in most cases the plans have only partially been put into execution, while in only too many instances no work of any sort has been commenced. Nevertheless, there is every indication that this state of affairs is not going to last, and that motor roads will be coming into existence in every direction.

Outstanding in the construction of motor roads is the province of Shansi, Governor Yen Shi-shan having long ago concluded that the best way to develop this province was the wholesale and immediate introduction of motor traffic and the building of motor roads instead of the much slower and more expensive construction of railways. As a matter of fact, considering the hilly and mountainous nature of this province, there is a lot to be said in favour of Governor Yen's policy, although it is evident that sooner or later railways, at least connecting the main towns, will have to be built if the province is to be developed to its maximum potentiality.

Shansi, however, does not hold pride of place as to the total mileage of motor roads it contains. This position is held by Shantung, which boasts 1,675 miles of motor roads, mainly due, it must be admitted, to the work of the American Red Cross and the China International Famine Relief Commission.

Next to Shantung comes Honan with 1,338 miles of motor roads, again mostly built by the International Famine Relief Commission in 1922 and 1923, while Kiangsu makes a good third, with, 1,241, and Shansi

fourth with 1,069 miles of motor roads. As the estimate of the Kiangsu road mileage includes the roads in and about Shanghai, it is possible that Shansi may beat this province in its mileage of country roads. According to the latest estimates, no other province has as much as a thousand miles of motor road, only seven having five hundred miles or over and eight having under that figure. Yunnan's motor road mileage has been estimated at from eleven to thirty-five, this province being a long way behind the others. But this is hardly to be wondered at when the extremely mountainous nature of this province is taken into consideration.

Considerable activity in motor road construction has been taking place of late in the provinces of Kiangsu, Chekiang, Kuangtung and Kuangsi, while Chihli province has not been idle in this respect. In many places motor bus companies have been responsible for the construction of roads between towns, while in some cases the local inhabitants have constructed roads for the use of automobile traffic, notably in Chihli.

Surveys for a road to run from Woosung at the mouth of the Whangpoo River in the Yangtze Estuary following the Kiangsu and Chekiang coasts to Hangchow are being pushed forward, as well as for many others in the eastern provinces of China south of the Yangtze. If things go according to plan, and the necessary funds are forthcoming, there should soon be a regular network of good roads in this part of China, which must inevitably give a tremendous impetus to the Shanghai motor car, lorry and bus trade.

Mongolia has 3,620 miles of motor road, including the longest road in the domain, namely, that from Kalgan to Urga, which is 800 miles in length.

The three provinces of Manchuria have only 1,500 miles of motor road between them, but road as well as railway construction is being pushed forward rapidly in this area, and we may soon find that the Three Eastern Provinces have taken leading place in this respect.

The Kwantung Leased Territory, that part of South Manchuria under Japanese control, has 331 miles of motor road, a lot of which is well metalled, even macadamized; while Hainan Island boasts 465, Hongkong and Kowloon 138 and Macao nine miles of motor road. The total mileage of motor road in China, Mongolia and Manchuria, inclusive of foreign concessions, leased territories and treaty ports, has been estimated by Miss A. V. Smith,* U. S. Trade Commissioner at Shanghai, as 18,485, the construction of which, considering that only a decade ago there was hardly a properly constructed road outside the treaty ports, and also that the country has been torn with internal dissensions and civil wars during almost the whole of the intervening period, is an accomplishment that is not to be despised.

The importance of motor roads to China can not be over estimated. The whole country's transport system is hopelessly backward, and, while an extensive net-work of railways is needed in order to develop the

*"Motor Highways in China," compiled by A. Viola Smith, assisted by Anselm Chuh, May 1, 1928, Shanghai.

country's resources, these railways must be fed by motor roads, while in many cases motor roads actually following the line of the railways would prove of the greatest value. Inter-provincial trunk roads have been planned and even commenced in some cases, and these must prove of the greatest importance to the country.

Unfortunately the various provincial treasuries have become so depleted of late, not to mention the national treasury, as the result of civil war, that it is a question how much they will be able to devote to the enterprise of motor road construction, and it is to be feared that unless some means can be devised for the introduction of foreign capital many of the excellent schemes now afoot to meet China's needs in this direction will not be put into effect for a considerable time.

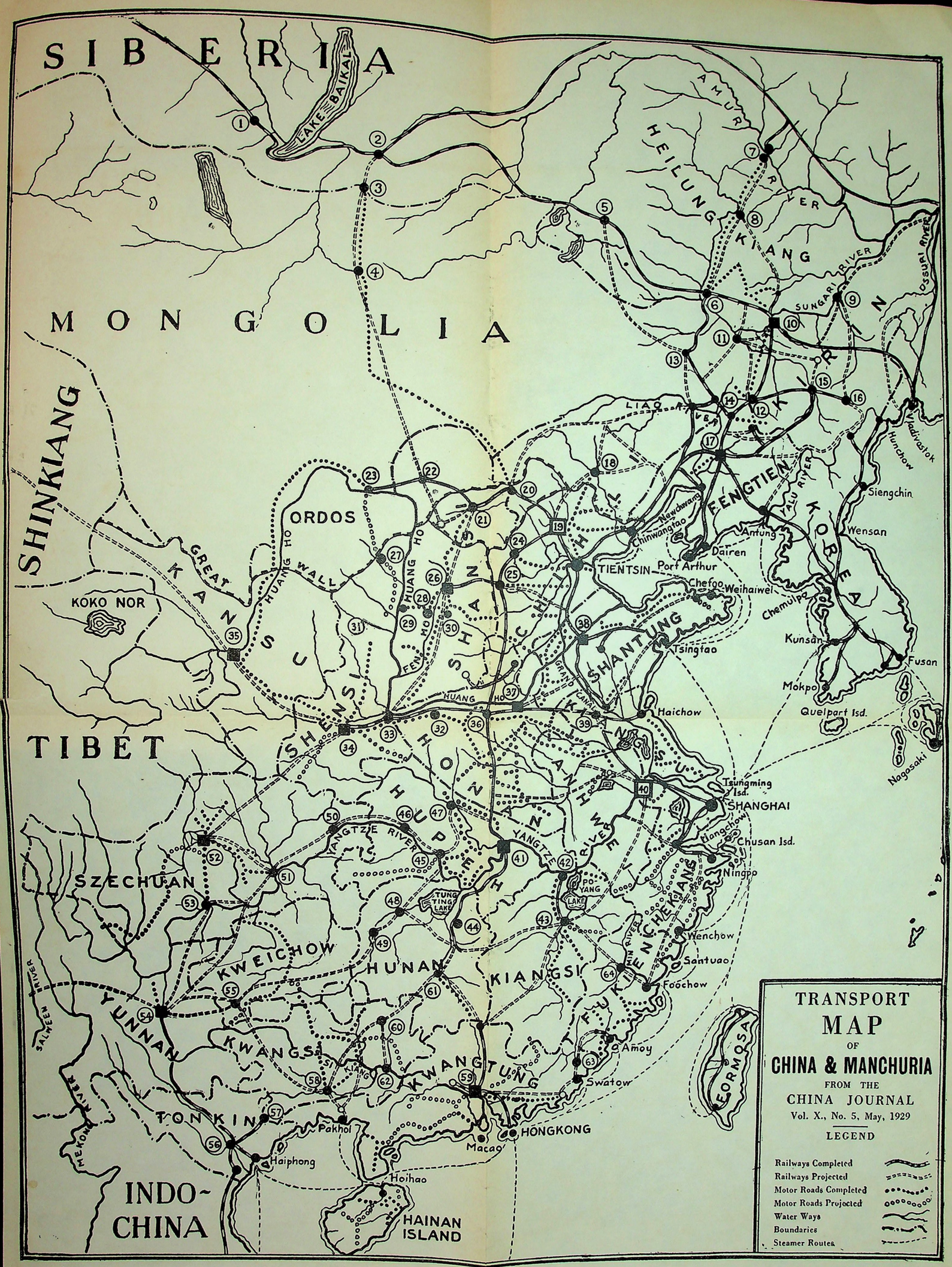
However, with the recent success of the Nationalist Government against the Wuhan party, hope has been renewed of a truly united China, and if this becomes a *fait accompli*, it is conceivable that confidence will be sufficiently restored for the advancement to China of foreign capital for the purpose of road construction. It might be suggested that the big motor industries of America and Europe should investigate this possibility, since the more good roads there are in China the greater the market for automobiles of all descriptions.

THE MOTOR HOUSEBOAT AND CRUISER IN CHINA

One of the most popular pastimes of the foreign community in such places as Shanghai is motor-boating, whether it be comparatively short outings on the adjacent rivers and creeks, or long cruises of several days duration into the hinterland in search of game or on holiday bent. China has always been a good country for houseboating; indeed most of the splendid shooting that made this country famous as a sportsman's paradise in the old days was done from houseboats. The days of the old fashioned houseboat are numbered, however, and more and more both sportsmen and pleasure trippers are taking to the motor houseboat or motor cruiser as the quickest, surest and in the end most economical means of getting to their shooting grounds or picnic spots and back.

Many old style houseboat owners have adopted the method of using a motorboat to tow the houseboat, but this cannot be considered economical, since, in addition to the expense of a mechanic to look after and drive the motorboat, and of the fuel used, it is necessary to have a full crew aboard the houseboat in case of accidents. It may, however, save a good deal of time, while the motorboat can be extremely useful in taking one about when one's destination has been reached and the houseboat moored. In this connection it may be said that of late out-board motors have become very popular, since these can be used even on *sampans*, while a small boat, fitted with an out-board motor and lashed alongside a houseboat, will, with the help of the *yuloh*, take it along at as much as five and six miles an hour.

But the ideal, of course, is a well equipped motor cruiser, and Shanghai boasts a number of very fine craft of this nature. Unfortunately, the initial outlay on such vessels is rather heavy, which means that they are somewhat beyond the purse of the average sportsman or houseboat enthusiast, and it would be a good thing for these if some enterprizing firm of boat-builders could hit upon a design that would give a 30 or 40 foot boat, with a good, cheap running engine, a fair turn of speed and the necessary accommodation for two to four passengers at a price of about two thousand dollars or so. It should be of shallow draft to enable it to get up some of the side creeks, and need not be alaborately fitted up within, at least to start with. The owner could add what he wanted in this direction as time went on.



TRANSPORT MAP OF CHINA & MANCHURIA

FROM THE CHINA JOURNAL

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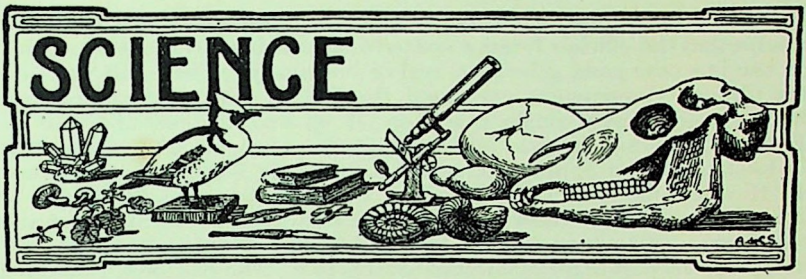
LEGEND

- Railways Completed
- Railways Projected
- Motor Roads Completed
- Motor Roads Projected
- Water Ways
- Boundaries
- Steamer Routes

Compiled from various sources by A. de C. Sowerby.

1 Urkutsk
2 Udinsk
3 Kiakhta
4 Urga
5 Hailar
6 Tsitsihar
7 Blagoveschensk / Taheho
8 Merguen
9 Sansing
10 Harbin
11 Petuna
12 Changchun
13 Taonan
14 Ssupingkai
15 Kirin
16 Tunghua
17 MUKDEN
18 Jehol
19 PEIPING (Peking)
20 Kalgan
21 Tatungfu
22 Shuiyuan (Kweihuacheng)
23 Paotouchen
24 Paotingfu
25 Chentingfu (Shihchiachuang)
26 Taiyuanfu
27 Yulinfu
28 Fenchowfu
29 Linhsien
30 Taikuhsien
31 Yenanfu
32 Honanfu (Loyang)
33 Tungkwan
34 Sianfu
35 Lanchowfu
36 Chenchow
37 Kaifengfu
38 Tsinanfu
39 Hsuchowfu
40 NANKING
41 Hankow (Wuchang / Hanyang)
42 Kiukiang
43 Nanchang
44 Changsha
45 Shasi
46 Ichang
47 Siangyangfu
48 Changteh
49 Shanchow
50 Wanshien
51 Chungking
52 Chengtufu
53 Suifu
54 Yunnanfu
55 Shinyifu
56 Hanoi
57 Lanson
58 Nanningfu
59 CANTON
60 Kweilinfu
61 Hengchowfu
62 Wuchowfu
63 Chaochowfu
64 Yenpingfu

SIBERIA
LAKE BAIKAL
MONGOLI
ORDOS
KOKO NOR
SHINKIANG



THE RAILWAY IN CHINA

From its very beginning railway enterprise in China has been confronted with many difficulties. Amongst the foremost of these have been the universal belief in *feng-shui*, ancestral worship and the attitude of the rulers of the country. To get a clear grasp of what railroad construction has meant in this country, one must first understand the significance of these three things. The two words *feng* and *shui* literally mean "wind" and "water," but taken together they have a connotation which may more accurately be translated "local luck" or "the luck of a place." No Chinese ever builds a house or a temple or chooses the site for a grave without consulting a soothsayer regarding the *feng-shui* of the place, that is to say, its position relative to the good and evil influences of the surrounding topography. Thus the introduction of an outside influence such as a mechanical devise like a railway may seriously upset the *feng-shui* of a whole countryside, thereby arousing a hostility from the people that may drive them to almost any lengths. Ancestral worship and the reverence in which Chinese hold their forbears is responsible for an extreme repugnance to having their graves disturbed, and since no railway could possibly be laid in China without disturbing innumerable graves, here is another very prolific source of trouble in railway construction. As to the attitude of officials of the old régime towards the introduction of railways, not only did they foresee complications in regard to the two foregoing conditions, but they also feared foreign aggression and were strongly suspicious of the motives that lay behind the requests for such important concessions as the building and controlling of extensive railway systems.

Add to this a natural distrust of innovations on the part of the Chinese people, high and low, and it will not be difficult to see why it was so hard in the first place to get China to take up railway transportation. Nevertheless, China now boasts well over 7,000 miles of railway line in her territory, by far the greater part of which, however, is due to foreign enterprise.

Railway enterprise in China began with the laying of a ten mile two and a half foot gauge line between Shanghai and Woosung in 1876

under the supervision of Mr. G. J. Morrison. Almost immediately the trouble that the officials foresaw occurred, as a Chinese committed suicide on the line over some grievance, real or imaginary. The result was that the Chinese Government purchased the line at cost price, after it had been running but a single year, tore it up and shipped the rails to Formosa, where a line was laid for military purposes. Previous to this in 1863, a number of Shanghai merchants, mostly British, had petitioned Li Hung-chang, the then Imperial Commissioner and Governor of Kiangsu, for the sole right to establish a railway between Shanghai and Soochow. This was refused. It was followed shortly after by an attempt on the part of Sir MacDonald Stephenson, who had been connected with railway construction in India, to interest the people and authorities in China in railway enterprise. But he, too, failed.

The construction of the Shanghai-Woosung Line was carried out without official sanction by a Shanghai company, and the project proved a complete success, as far as its use by the natives was concerned, but the suicide of the unknown Chinese coolie on the line upset this happy state of affairs, causing riots and ending, as stated above, in the purchase and removal of the line by the Chinese Government.

The next line to be laid in China was one built by Mr. C. W. Kinder, resident engineer of the Chinese Engineering and Mining Company which had been formed under the auspices of Li Hung-chang, then Viceroy of Chihli, and Tong King-sing to operate coal mines in the Kaiping district of North-eastern Chihli. This line was to connect the mines with a neighbouring canal, and the trucks and cars were to be drawn by mules ; but while it was being laid, Kinder secretly constructed a steam engine, and when this was finished it proved so successful and so much more economical than the use of mules, that it was allowed to operate. This was in 1881. In 1886 permission to extend this line to Lutai Canal was granted, a new company called the Kaiping Railway Company under Wu Ting-fang being formed to undertaket its operation. Bit by bit this line was extended, till at last it reached Tongku and then Tientsin. By 1894 it had been extended to Shanhaikuan and by 1896 some forty miles beyond. Here it stopped till work was recommenced after a loan with the British had been contracted, and in 1903 it was pushed on to Mukden. Subsequently it was extended to Fengtai near Peking and ultimately to the capital itself. Thus came into being the Peking-Mukden Railway, the first permanent railway in China.

Meanwhile Russia had secured an agreement with the Chinese Government which permitted her to build the Chinese Eastern Railway in North Manchuria with a branch from Harbin to Port Arthur, while France secured the right to extend her Annam railways into China, but did not do so until 1898.

In 1897 work was started on the Peking-Hankow Railway, the first hundred miles to Paotingfu being completed in 1899, when it was handed over by the British engineers to a Belgian syndicate.

Meanwhile Germany had secured railway concessions in Shantung and began the construction of the Tsingtao-Tsinan Railway in the same year.

The outbreak of the Boxer trouble in 1900 naturally interfered with railway constuction all over China, and little was done for a couple of years after this momentous event, but in 1902 the Chuchow-Pingshiang Railway was completed, and by 1903 the line from Shanhaikuan to Mukden was completed. The following year, 1904, the Tsingtao-Tsinanfu Railway was completed by the Germans, as also was the Canton-Samshui line in South China, while the Yunnan Railway was commenced by the French and the Shanghai-Nanking Railway by the British. Late in 1905 the Peking-Kalgan Railway was commenced, being constructed entirely by Chinese engineers, the Peking-Hankow Railway was completed, and the Shansi or Chentingfu-Taiyuanfu (called the Chentai Railway) and the Pienlo or Kaifengfu-Honanfu Railways were commenced.

By now, Japan, having secured rights in Manchuria, was busy with the South Manchuria Railway, which was opened to traffic in 1907. The Chentai Railway was completed the same year. In 1908 the northern section of the Tientsin-Pukow Railway was started by the Germans, in which year also the Shanghai-Nanking line was completed, while the Peking-Hankow line came under Chinese Government control. The following year the southern section of the Tientsin-Pukow line was commenced by the British, while the Kiangsu-Chekiang Railway under provincial control was progressing. This ultimately came under the same control as the Shanghai-Nanking Railway, and was finally completed as far as Ningpo in 1916, when it became known as the Shanghai-Hangchow-Ningpo Railway.

In 1910 the Chinese Government started the Kirin-Changchun Railway, which was completed in 1913, while the Peking-Kalgan Railway, which had been completed in 1909, was pushed out westward towards Tatungfu, on into Shansi, reaching that place in 1915, Suiyuan (near Kueihuacheng) in 1921 and Paotowchen in 1923. The Szechuan-Hankow Railway was also started in 1910, but owing to financial difficulties little was accomplished. A small railway from Changchow to Amoy was completed this year. The Pienlo was pushed westward from Honanfu towards the Shensi border, and has now reached Sianfu, the capital of that province.

In 1914 the famous Lunghai Railway, destined to run from Hsuchowfu, on the Tientsin-Pukow line to Kaifengfu, was started, as also was the Hupeh-Hunan section of the Canton-Hankow Railway. The former was completed in 1916.

What is known as the Ssu-tao Railway (Ssupingkai to Taonan) in Manchuria was commenced about this time and completed in 1923, since when practically all railway construction has ceased, except in Manchuria, where a number of short lines have been built by Chinese and Japanese.

It will be seen from the foregoing brief history of railway construction in China that the most active period in this field of development was from just after the Boxer outbreak in 1900 up to the outbreak of the Revolution in 1911. It was during that period that most of the great lines were built.

With the exception of the South Manchuria Railway and the Chinese Eastern Railway, both in Manchuria, the Yunnan Railway, and a few small private and provincial lines, all the railways in the country are under the control of the Chinese Government, though most of them were originally financed and built by various European groups, having been redeemed by the Chinese Government by means of loans raised for the purpose. Naturally they represent an enormous amount of capital, and constitute a very important national asset.

It is impossible here to give a detailed account of each of the twenty-nine separate railways in China and Manchuria, but following will be found short accounts of some of the more important of these.

It is almost unnecessary to say that latterly, under the chaotic conditions that have prevailed, the railways of China, or at least those that have fallen into the hands of the warring factions, have suffered very considerably, both in regard to damage to the tracks, bridges, buildings and rolling stock and to the sequestration of funds, and it will be some time before they will be in full running order again. However, much is being done, and, providing peace is maintained, we may soon see a resumption of the splendid service that was in existence previous to the outbreak of the revolution in 1911.

At the same time we may look forward to a resumption of the vast railway construction schemes that have been drawn up from time to time ; schemes, which, if put into effect, will give the country a network of main lines that will add enormously to its prosperity and increase of trade.

As a matter of fact work is actually being carried out in various parts of the country under the supervision of the Ministry of Railways, while experts have been engaged from abroad to act in an advisory capacity to that institution.

THE SHANGHAI-NANKING RAILWAY

This railway runs more or less parallel to the estuary of the Yangtze between Nanking and Shanghai through rich, rice-growing and silk-producing country, passing the important towns of Soochow, Wusih and Chinkiang. The line from Shanghai to Woosung at the mouth of the Whangpoo River is now part of this railway. This section was originally built in 1876, being the first railway in China, but was torn up and shipped to Formosa by the Chinese Government. The main line from Shanghai to Nanking was started in 1904 and completed in 1908 having been built by British engineers. It connects with the Tientsin-Pukow Railway at Nanking by means of a ferry across the Yangtze to Pukow, and with the Shanghai-Hangchow-Ningpo Railway at Shanghai. Including the line to Woosung, it is 203 miles in length. In 1928 it carried 10,861,405 civilian passengers and 171,000 military passengers, which yielded receipts totalling $7,975,120. The freight carried the same year was 1,367,649 tons, yielding receipts to the amount of $2,216,745. The railway is under joint Chinese and British administration.

THE SHANGHAI-HANCHOW-NINGPO RAILWAY

Serving the two provinces of Kiangsu and Chekiang, this railway passes through very similar country to that traversed by the Shanghai-Nanking Railway. It was built in sections, at different times and by different groups. In 1914 the various sections were taken over by the Government, which took a loan from the British

and Chinese Corporation to effect the purchase, after which the whole line was placed under the same management as the Shanghai-Nanking line. It is 181 miles in length.

THE CHINESE EASTERN RAILWAY

This is an important railway running through Northern Manchuria from Manchuli, on the border of Heilungchiang Province and Transbaikalia, to Suifenho on the border of Kirin Province and the Ussuri Province of Eastern Siberia, where it connects with the Ussuri Railway and so to Vladivostok. At Manchuli it connects with the Trans Siberian Railway. From Harbin a branch runs to Changchun, where it meets the South Manchuria Railway, while it is joined by a branch line at Tsi-tsi-har. Formerly under Russian control, it is now jointly administered by the Soviet and Chinese Governments. Its total length, including branch lines, is 1080 miles. It was started in 1896 and completed three or four years later.

THE SOUTH MANCHURIA RAILWAY

One of the chief factors in the development of South and Central Manchuria, this railway runs from Dairen to Changchun, with a branch line from Mukden to Antung at the mouth of the Yalu River. Here it connects with the Chosen Railway, while at Changchun it connects with the southern branch of the Chinese Eastern Railway and with the Changchun-Kirin Railway. At Mukden it is joined by the Peking-Mukden Railway. It is run by the South Manchuria Railway Company, a Japanese concern with very extensive interests in South Manchuria. Including branch lines it has a length of 759 miles. It is entirely owned and controlled by Japanese.

THE PEKING-MUKDEN RAILWAY

This line is also known as the Kin-Feng Railway and it runs from Peking to Mukden, the capital of Fengtien Province in Manchuria, a distance of 526 miles. It also has some 80 miles of branch lines. It was commenced in 1880 as a small line by Mr. Claude W. Kinder, C.N.G., who was engineer of a Chinese coal mining company in the Kaiping district, and was to connect the mines with a canal a few miles distant.

From these insignificant beginnings it developed by degrees, and was finally completed from Peking to Mukden in 1907, being under British management. The line is of the standard gauge, namely, 4-ft. 8½-in., is well constructed and carries an excellent array of rolling stock, though this has been sadly depleted as a result of the recent wars in this part of the country. It passes through very rich country, including the important coal mining area at Tongshan, and serves the two ports of Tientsin and Chinwangtao.

It is undoubtedly one of the most important railways in the country, making connections with the Peking-Suiyuan and the Peking-Hankow Railways at Peking, the Tientsin-Pukow Railway at Tientsin and the South Manchuria Railway at Mukden. In 1925 it carried 6,317,217 passengers and 7,720,141 tons of freight, while its earnings were over twenty-four million dollars, and its profits over ten million.

THE TIENTSIN-PUKOW RAILWAY

Generally known as the Tsing-Pu Railway, this line connects the important treaty port of Tientsin with Pukow on the Yangtze opposite Nanking. It follows the general direction of the Grand Canal, passing through the provinces of Chihli, Shantung and Anhwei into Kiangsu, and taps a wide stretch of exceedingly rich country. At Tsinanfu, the capital of Shantung, it connects with the Tsingtao-Tsinan line. Built in two sections, the northern was commenced in 1908 and constructed by German engineers, the southern section being commenced at a later date by British engineers. The whole line was open to through traffic in 1912. It is of standard gauge, and is 627 miles in length, with 60 miles of branch lines. For most of its length it passes over flat plains, skirting low hills in Shantung. South

of Pengpu, an important station on the Huai River, it passes through a belt of hilly country on the Anhwei-Kiangsu border before descending into the valley of the Yangtze. Here the country is wild, sparsely populated and offers good shooting. It is the only part of the whole line which has any pretence of scenic beauty. In 1924 over four million passengers were carried and nearly three million tons of freight, while the profits for the year were over nine million dollars. For some time no through trains have been running on this line, but recently attempts have been made to re-establish a through service.

THE PEKING-HANKOW RAILWAY

This is the longest line in China Proper, being 755 miles in length, with 70 miles of branch lines. It is standard gauge, having been commenced in 1898 and completed in 1905. The first hundred miles was laid by British engineers, this being handed over to the Belgians in 1899, the rest of the line being completed by them and the French. From Peking it travels in a south-westerly direction towards the Shansi border, striking south at Chen-ting Fu and continuing in that direction through Honan and Hupeh to Hankow. At Chenchow it is crossed by the Kaifeng-Honan Railway, or Pienlo, and a little to the north it is met by the Tao-Chin Railway (the Pekin Syndicate Line). It is a very important line, its total revenue for the year 1923 being $32,012,578, and the profits derived therefrom nearly twenty million dollars. It crosses the Yellow River by means of a fine steel bridge, constructed with great difficulty. At Shih-chia-chuang, close to Chen-ting Fu, it is joined by the Chen-tai or Shansi Railway.

THE PEKING-SUIYUAN RAILWAY

This line was originally commenced as the Peking-Kalgan Railway by a Chinese engineer, the late Jeme Tien-yu, in 1905, and was completed as far as Kalgan by 1909. It was then continued in a westerly direction reaching Ta-tung Fu in 1915, Sui-yuan in 1921 and Pao-tow Chen in 1923. It is 507 miles in length, and is chiefly important as a carrier of produce, wool, hides, skins and grain, from the great north-west to the metropolis, whence these are carried on to the port of Tientsin. The profits derived from this railway in 1924 were a little over two million dollars. It taps very poor country, and, but for the produce coming by this route from Central Asia to the coast, would not have justified its existence. Ultimately it may reach Lan-chou Fu in Kansu, when it will become a very much more profitable undertaking. It is interesting to sportsmen as it brings them to within easy reach of big-horn sheep and wapiti country, while its importance to archæologists lies in the fact that it passes Ta-tung Fu, where are situated some Tang Dynasty cave temples and rock carvings.

THE SHANTUNG RAILWAY

Running 245 miles from the port of Tsingtao to Tsi-nan Fu, the capital of Shantung, this railway was built by the Germans, having been commenced in 1899 and completed in 1904. There is a branch line of 24 miles to the Poshan Colliery, another of four miles to the Tzuchuan Colliery and one of just over four miles to the Tiehshan Iron Mine. The line forms the main artery of goods traffic in Shantung, feeding the port of Tsingtao. It has not been a very profitable line, the profit in 1926 being under a million and a half dollars, though in 1924 it was twice that figure.

THE SHANSI RAILWAY

Also known as the Chen-Tai Railway, this is a metre gauge line running a distance of 150 miles from Shih-chia-chuang, near Chen-ting Fu on the Peking-Hankow line, to Tai-yuan Fu, the capital of Shansi. It passes through the high mountainous country of East Shansi, tapping the rich coal mining areas of Ching-shing Hsien and Ping-ting Chou. It is one of the few railways in China that affords the traveller

views of fine scenery. Its profits in 1926 were just under three million dollars, the proportion to the takings and running costs being very high. It was built by French engineers during the years 1904 to 1907, calling for much skill in its construction, owing to the nature of the country through which it passed.

THE YUNNAN RAILWAY

Though this railway actually extends from Haiphong in Tonkin to Yun-nan Fu in Yunnan, the part that concerns us is only that in the latter province. The total length is 528 miles, of which 288 are in Chinese territory, though under French control. The Tonkin section was commenced in 1901, the Yunnan section in 1904, the whole being opened to traffic in 1910. This is undoubtedly China's chief scenic railway, the country through which it passes being notorious for its beauty and grandeur. Great engineering skill was called for in its construction, there being some remarkable bridge building work done by its builders.

OTHER RAILWAYS

The following other railways exist in the country :

Taokow-Chinghua Railway in Honan (Peking Syndicate Railway), 93 miles.
Lung-Hai Railway, from Hai Chow on the coast of Kiangsu to Si-an Fu in Shensi, 533 miles.
Kirin-Changchun Railway in Central Manchuria, 80 miles.
Kirin-Tunhua Railway, 130½ miles.
Chuchow-Pinghsiang, 65 miles.
Canton-Kowloon Railway, 112 miles.
Changchow-Amoy Railway, 18 miles.
Ssupingkai-Taonan Railway in West Manchuria, 264½ miles.
Taonan-Tsitsihar Railway, 141½ miles.
Canton-Hankow Railway (Completed portions), 453 miles.
Kiangsi Railway (Completed from Kiukiang to Nanchang), 86 miles.
Sunning Railway, 63½ miles.
Swatow Railway, 26½ miles.
Tayeh Mines Railway, 17 miles.
Tai-Tsao Railway, 27 miles.
Hulan-Hailin Railway, 70 miles (50 miles under construction).
Takushan-Changwu Railway, 70 miles.
Mukden-Hailungcheng Railway, 110 miles (32 miles under construction).

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MOTOR TRANSPORT IN CHINA

If there is one thing that has done more than any other to revolutionize vehicular traffic throughout the world it is the internal combustion engine, a much execrated but exceedingly useful mechanical devise, which has been the means of placing within the reach of the 20th Century man-of-the-streets sufficient controlled motive force to transport him and his chattles at a previously undreamed-of speed from place to place

with an ease and at a cost that is incredibly small. Adapted to form the motive power of every conceivable type of vehicle and craft, it has become the great rival of the steam engine both on land and on water, while until its discovery or invention the air as a medium of travel remained completely beyond the reach of mankind.

In one way or another it has eclipsed every other means of transport on land, and is bidding fair to put steam-driven vessels out of the running on the ocean. By its means previously unassailable deserts have been conquered, and to-day, as the motive power of the aeroplane and the air-ship, it is doing in a few hours what took months and even years to do before in the way of polar exploration.

Never before has the human race experienced such mobility, as, with the minimum of effort and enjoying every comfort the while, its members tour from place to place, extending the scope of their activities by hundreds of miles in every direction and giving them continents instead of counties for their playgrounds.

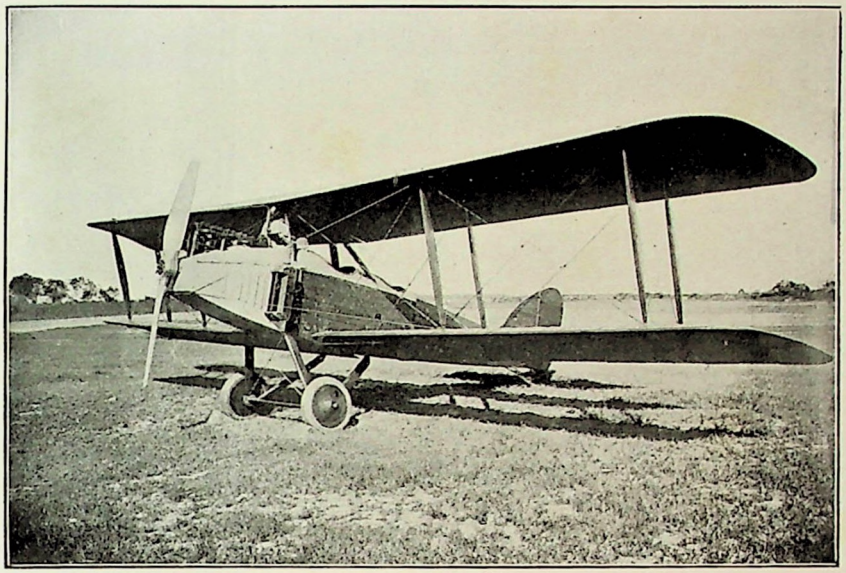
It is impossible to say how much the motor car has done for America in the last thirty years, and it has become a byword that every labourer and domestic servant in that country can have his or her car. While Europe is still behind America in this respect, possibly because of a more fully developed railway system, the effect of the motor car and motor lorry on the community and its well-being there too has been tremendous, so much so, indeed, that the people of the 20th Century seem to be living in a totally different world from those of the 19th Century. It was the existence of motor transport in Great Britain that was mainly responsible for the failure of the general strike in 1926 to paralyze the nation and force it to the will of the trade unions.

To China now comes this tremendous boon, and, finding but a comparatively few railways and fully ninety per cent. of the population and their goods travelling or being moved by methods that date back at least a couple of millenniums, offers a solution of the transport problem of this great country so sound and simple that it is bound to be the one most universally adopted.

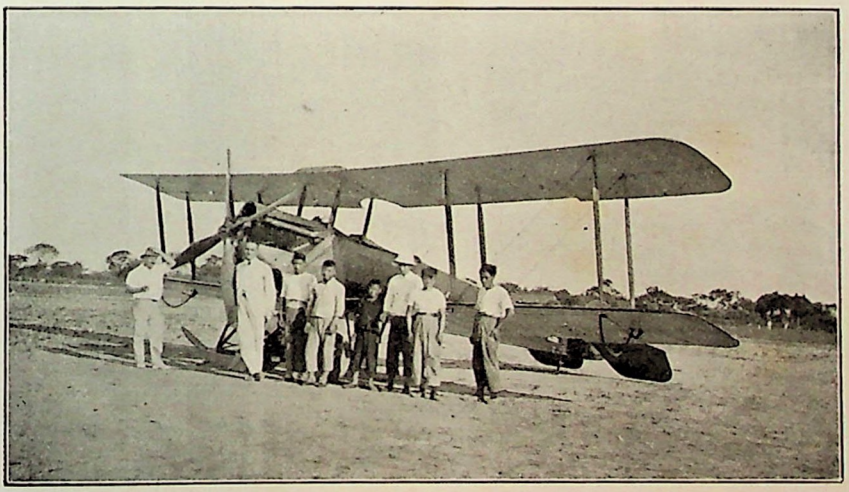
While there is no gainsaying the advantages of railways, either for the transportation of passengers or merchandise, the fact remains they are so slow in coming into being in China, especially as this country finds herself so close to bankruptcy, that it is a foregone conclusion that the motor car and motor roads will be carrying the greater part of her traffic, human and otherwise, long before the iron ways have wound their snail-paced tracks over their destined courses.

While railways are being planned and projected and budgetted for, motor roads are materializing in every direction, and while the Government and international financial groups are discussing the wherewithal to purchase rolling stock, automobiles are pouring into the country at a rate that is little short of astounding, considering the financial state of the country.

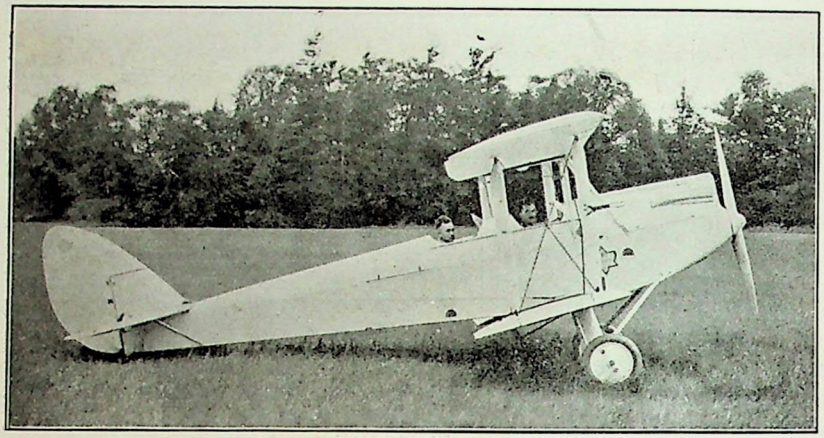
It took nearly fifty years to complete China's seven thousand or so miles of railroad : it has taken less than a decade to complete her eighteen thousand miles of motor road ; and during the time that it will take for



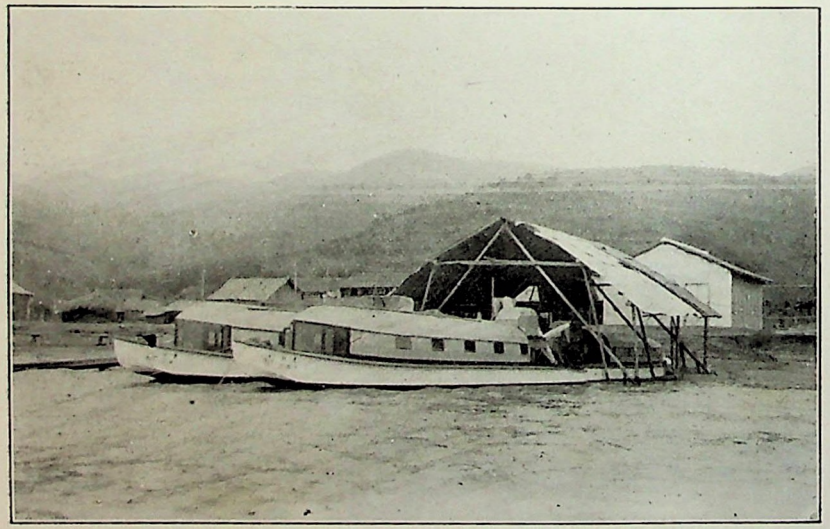
The First Flying Machine made in China. It was built in 1922 at the Lungwha Aerodrome, Shanghai, and was flown in July, 1923, by Major W. E. Holland. It was a Two-seater with a 200 h.p. Mercedes Engine, and a Wing-span of 38 ft.



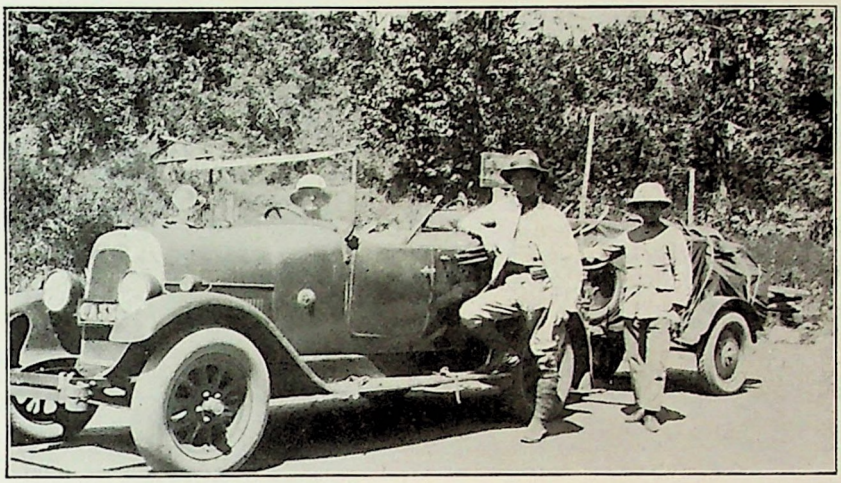
A British Avro Machine purchased by General Ho Fan-lin in 1920 and still in use at Nanking. It is a 504 Model, Two-seater with an 80 h.p. Renault Engine. It was the first Government Machine to fly over Shanghai.



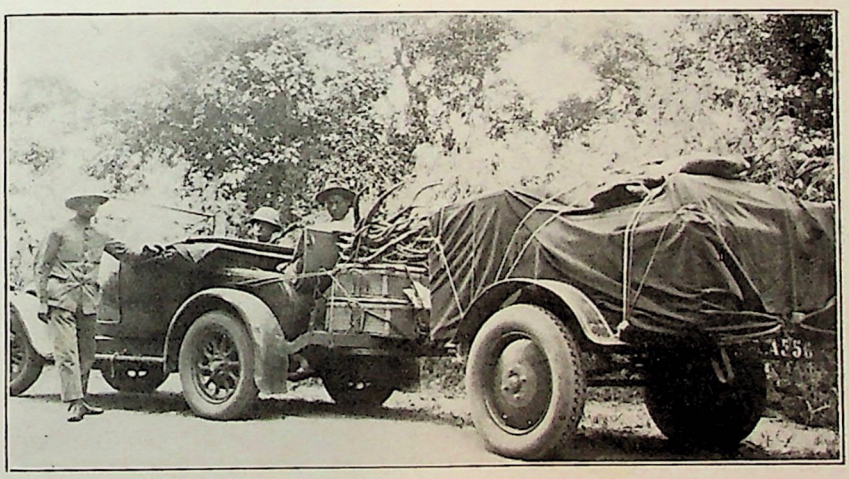
The Modern Gipsy Moth, 80 h.p. Cirrus Engine, Two-seater, Light Plane as Piloted by Captain Jones in Shanghai. It is considered the ideal type of Plane for Flying Clubs and Training.



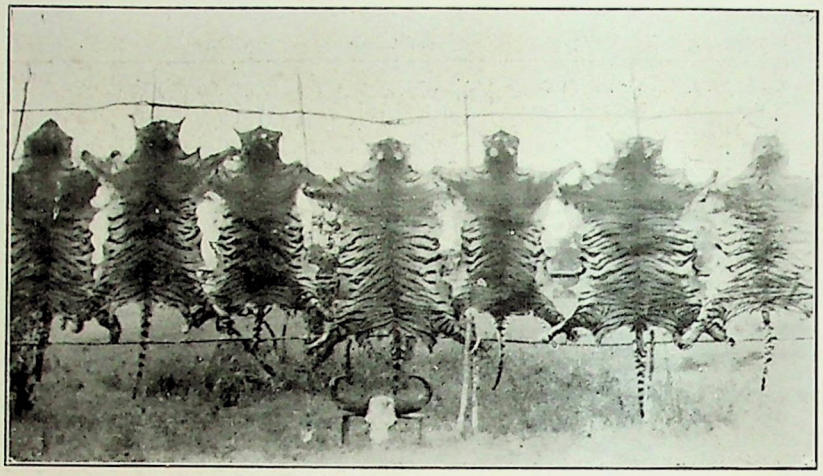
Two Hydro-Gliders in use on the Chien Tang River by the Ta Hwa Navigation Company. They draw only 4 inches when running, carry 20 Passengers and can do 30 Miles an Hour.



Mr. Rowland Bandinel beside his Car on one of the Magnificent Roads through the Jungle in Indo-China. Note the Trailer behind.



The Car and Two-wheeled Trailer used by Messrs. E. Edgar and R. Bandinel on their trip last Winter into Indo-China after Tigers. This facilitated their Movements to such an extent that they were able to kill no fewer than seven Tigers.



The Skins of the Seven Tigers and the Skull and Horns of the Magnificent Gaur shot by Messrs. E. Edgar and R. Bandinel in Indo-China last Winter.



The Camp set up by Messrs. E. Edgar and R. Bandinel while hunting Tigers in Indo-China last Winter, when everything was carried on a Motor Car and two-wheeled Trailer imported for the Purpose.



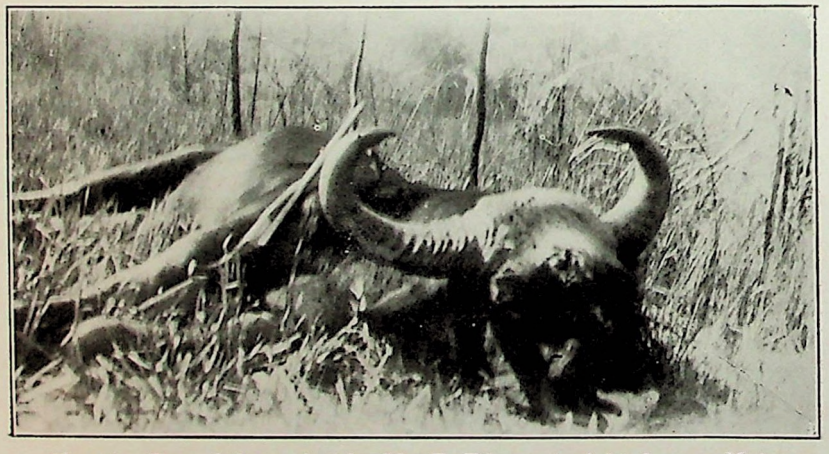
Mr. Ernest Edgar, a Chinese "Snipey" from Tientsin, and the best Tiger shot on his and Mr. R. Bandinel's recent trip into Indo-China.



Bringing the Bag into Camp. An incident of Messrs. E. Edgar's and R. Bandinel's expedition after Tigers in Indo-China last Winter.



A fine Sambur Stag shot by Mr. R. Bandinel in Indo-China. These Deer were used for Tiger Bait, being extremely abundant.



Almost a Record Gaur shot by Mr. E. Edgar at night from a Motor Car while on a Trip last Winter into Indo-China after Tigers.



Mr. E. Edgar and one of the Tigers which be shot recently on a Trip in Indo-China.



Mr. Rowland Bandinel and one of the Tigers he shot in Indo-China last Winter.



The Fleet of Motor Cars and Trucks of the Third Asiatic Expedition of the American Museum of Natural History under Dr. Roy Chapman Andrews. On the Mongolian Plateau.

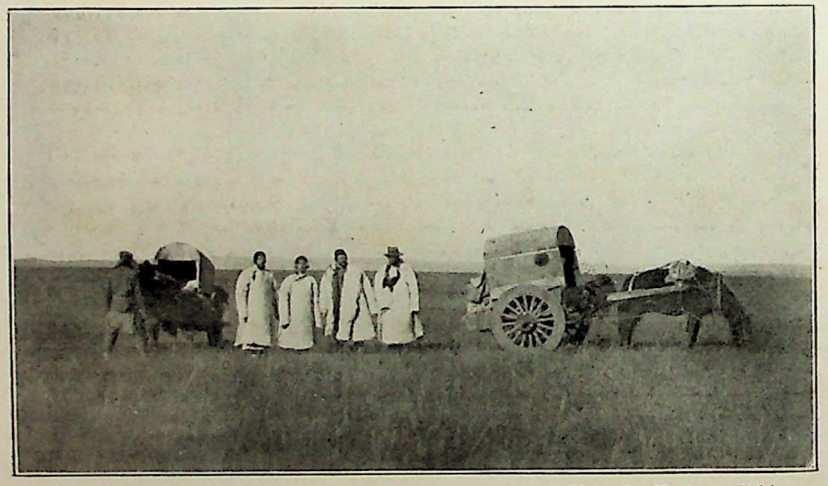


Photo by Hartung, Peking.

The Old Method of Travel on the Mongolian Plateau. The so-called "Peking Carts" or *Chiao Cheh*, can only be used in this Region in Summer. In Winter a larger Cart drawn by a Camel is used.

the railways at present projected to be built, the country will have become a network of motor roads, and one will be able to travel almost the length and breadth of China in one's automobile.

Not, let it be understood, that in making this statement we are prompted by any idea that railways should not be constructed. On the contrary, we believe that this country's ultimate prosperity will depend upon the extent and efficiency of her railway system, since in the long run, the railway must prove the most economical means of overland transport. Merely it is intended to point out how that, in the interim, the motor car offers the best solution of China's great transport problem.

One has only to glance over available figures regarding the importation of automobiles to realize that the Chinese people are seizing upon this means to overcome the difficulties with which they are faced in the matter of transport.

At the end of 1927 there were estimated to be 24,466 motor vehicles of all sorts in China.* Five years earlier there were but 8,200. Just under four thousand were imported during the year 1927. In 1928 some 4318 motor vehicles (motor cars, cycles and lorries) were imported into China from the United States of America alone, while they are coming in at an even greater rate since January of this year. The total number of motor vehicles in China at the beginning of 1928 was over twenty-four thousand.

In another article we have seen the tremendous impetus that has been given of late to the construction of motor roads.

Everywhere motor bus companies† are springing into being, in many cases, the companies themselves undertaking the construction and maintenance of the roads, while motor car dealers are having difficulty in coping with the orders they receive. Large orders are being taken for districts where there are practically no roads, which only goes to prove what many have contended, namely, that there is no need to wait for roads. That is to say, given motor cars, roads will almost immediately follow, and this is as true of China as it has been found to be of other countries.

To give an idea of what the motor car importing business has become in China it may be stated that there are over two hundred and seventy importers and distributors of automobiles and accessories in this country. These are scattered throughout the treaty ports, the number only including firms or individuals actively, not sporadically, engaged in the business.

It is almost superfluous to mention in detail the advantages offered by motor transport in this country. Anybody with any knowledge of China and with any imagination can appreciate what it must mean to the Chinese to have so adaptable and rapid a means of conveyance as the automobile at their disposal, but, for the sake of those who are not

*Automotive Importers and Distributors in China, by A. Viola Smith, 1928.

† There were 26 such companies in China in 1926, many more have been started since.

familiar with conditions in the interior, a few points may be offered for consideration.

To begin with, even where human labour is as cheap as it is in China, it cannot compete with motor-driven machinery, for which reason the motor lorry is bound to come into its own in this country, especially on the northern and north-western outskirts of the Republic, where tremendous stretches of more or less flat, sparsely inhabited country exist, and enormous quantities of produce—grain, wool, skins and hides—are brought in from Mongolia and Central Asia. Motor lorries must also be used to feed the existing and future railways with freight from the country side, while motor bus services will perform the same function as regards passengers. Then, too, there are many areas where railways are, for the present at least, impracticable, an example being the valley of the Min River in Fukien. Here a motor road has been, or is being, built along the river bank at a comparatively low cost, whereas a railway would be excessively expensive and difficult to construct.

Probably the best example of what automotive transport can do for this country is offered by present conditions in Mongolia, where motor transport services have been established from Kalgan to Urga, accomplishing a journey in four days, that, under old conditions, used to take twenty-eight days or a month.

It is many years since the Gobi was first crossed by a motor vehicle, one of the first to accomplish this being Professor E. T. Nystrom of the Shansi University, Taiyuanfu, as long ago as 1907. He performed his journey on a motor-cycle. Everybody to-day knows what has been accomplished with the aid of motor transport by the American Museum of Natural History's expeditions into Mongolia under Dr. Roy C. Andrews.

In discussing motor transport in this country, we must not fail to mention the increasing use of motor vessels of all kinds on China's inland waterways. In the vast network of creeks and canals that covers the area between the Yangtze and Chientang Estuaries in Kiangsu and Chekiang, motor driven launches and ferries are becoming almost universally used, to such an extent, indeed, that it is possible to get almost anywhere in this area from Shanghai in a few hours. On the Chientang River in Chekiang and the Min River in Fukien motor-driven boats of light draft, drawn by aeroplane propellers and capable of ascending the rapids with which these rivers abound, have been established.

Finally we have the introduction of the aeroplane into China, and here, too, rapid strides are being made. Up to the present aeroplanes have been imported mainly for war purposes, but at present the commercial side of the question is receiving attention, and we may soon hope to see regular air-mail services established.

In short, when we consider the enormous extent of this country and her tremendous population, and realize that the people have waked up to the advantages of Western modes of transport and that their need in this direction is possibly greater than in any other country in the world, it becomes evident that there is certainly no greater potential market for motor vehicles than China, and it behoves all those engaged in the motor manufacturing industries of America and Europe to take full

advantage of the great opportunities that will be offered them in the immediate future.

China's salvation lies to a very great extent in good roads and motor transport, and it is certainly incumbent upon those who wish to sell motor vehicles to do all in their power to help bring into being an adequate system of good roads.

AVIATION IN CHINA

BY

CAPTAIN V. J. B. HOLLAND, M.C.

When one speaks of aviation in China one immediately visualizes the possibilities of the four hundred million more or less, of China's population taking the air. The vast distances to be covered and the relatively slow existing means of travel are conducive to the establishment of successful aerial transportation.

However, what little experience aeronautical firms have had in marketing their machines in China has not unfortunately, always been very promising. The signing of the new treaty recently, however, should considerably change the conditions of carrying out trade and business.

Bacon has said that there be three things that make a country great and prosperous—fertile soil, busy workshops, and an easy conveyance of men and commodities from one place to another.

Great delays now occur to those who have desire to do business with different parts of China. People up-country are often cut off from the more civilized centers by many days, many weeks and even months of travel.

All this hinders good administration, quick intercourse, and undoubtedly is bad for business and general commerical advancement.

The development of air travel is proceeding by leaps and bounds in many parts of the world. In other parts, particularly China, it is almost stationary.

Surely, then, China should create a real air policy and use all resources for linking up the scattered portions of her vast country, the principle of which is not solely to plan for Chinese gain, but to bring about such better international understanding as to create such a situation that controversies between China and other nations need not arise.

The latest report on aviation in this country shows that the National Government is taking an intensive interest in civil aviation and its possibilities. A grant of ten million dollars has been made to the

Aeronautical Bureau, with the object of encouraging in every possible way those who are devoting their energies to air enterprise.

A very modest beginning, admittedly, but one that spells hope for the future.

It was in 1920 that China first took an active interest in aviation and it may be interesting to recall the events during and since that time.

In 1919, what is now termed the "Vickers Loan" was made between Messrs. Vickers & Co., Ltd., and the Peking Government, and a certain number of converted war type machines, which included the Vickers' Vimy and Avro training machines, were delivered to Peking early in 1920. Aerodromes were opened, workshops erected and a definite system of training Chinese pilots and mechanics under foreign supervision was established.

In the meantime the postal authorities started a scheme for linking up China with air mail lines, and that able British pilot, Col. H. St. Clair Smallwood, carried out the necessary survey work. The present Hungjao Aerodrome at Shanghai was one of the chain of air mail aerodromes. Two Handley Pages and two S.E.S. machines were imported. Unfortunately this commercial scheme did not mature.

The political squabbles and military activities intervened, finally culminating in the seizure of all the available aeroplanes and material by Military Tuchuns, and Col. Smallwood and his staff returned to England.

Whilst the Military Tuchuns had the machines, they had neither the ground organization and knowledge, nor sufficient pilots to fly the machines available, with the inevitable consequence that the machines were left to rot.

That they had gained some appreciation of the value of aircraft was evidenced by the fact that the Mukden Government then commenced another aviation scheme and a contract was concluded with some French firms for the Brequet No. 14 type early in 1923.

During this period a small international group of enthusiastic foreigners launched a scheme in Shanghai, with the object of importing engines and demonstrating to the Chinese officials the feasibility of building the fuselage with Chinese labour and from Chinese materials.

General Ho Feng-lin gave his support to the scheme and the first machine ever made in China was the result. Made at the Lungwha Aerodrome, Shanghai, from Chinese materials exclusively, it was flown in July, 1923. This machine, as will be seen from the accompanying illustration, followed orthodox lines and came up to expectation in every way. The pilot, Major W. E. B. Holland reported that she behaved very satisfactorily in flight. An interesting feature in connection with this event, is that the propeller was given, as a souvenir to the Royal Air Force Association of Shanghai in appreciation by the designers for services rendered.

It was unfortunate that military disturbances should again intervene and so destroy the peaceful expansion of aerial schemes in China.

With such difficulties it was only natural that the handful of Chinese and foreigners interested in aviation should become discouraged.

There remained a period of quiescence practically from 1923 to the present day.

The great advance made in civil aviation throughout the world and the historic long-distance-flights accomplished during the last four or five years have had their effect on China. Once again interest has been aroused, and whilst the military commanders are keenly alive to the new arm of the services, the Government are taking a practical interest in the possibilities of development of aerial transport.

The latest tentative proposals afloat are for the formation of flying clubs throughout the country, and the opening in the very near future of an aerial line between Shanghai and Hankow.

The Chinese Government have actually placed orders for a quantity of Moth machines, and Avro-Avian, both of which are suitable for school and club purposes. Some Ryan and Curtis machines have also been ordered and the Fokka ; whilst inquiries are abroad for the largest type of aircraft passenger types.

With the unification and centralization of China under the Kuomintang and the National Government arguing well for her soon to take a leading part in world affairs, the importance of aerial development in China cannot be overestimated, and it is gratifying, not only to the writer who has long been closely connected with aviation in China, but to all well-wishers of aerial development, that the Government are at last giving very serious and practical support to the important business of establishing a network of airways, similar to that now established in Europe.

If this is done, and done successfully, it will do more to strengthen the seeds of patriotism than anything else, and it will most certainly be a memorable day for China when the Chinese themselves are able to accomplish the long-distance-flights as others have done.

THE HISTORY OF AVIATION IN CHINA

According to the 1928 edition of the " China Year Book" the efforts on the part of the Chinese authorities "to develop a National Aviation Department, controlling both military and commercial flying, have finally resulted in complete failure.....commercial aviation has been a pronounced failure, military aviation is entirely in the hands of the provincial militarists, and Peking is without planes or men to fly them, except those in military use. The last of those which might have been considered the property of the Central Government (nine or ten twin-engine Vickers-Vimy) are now in the possession of the Kuominchun." This, of course, must have been written early in 1927 ; things have

changed very considerably since then. But we quote it, since it sums up in a few words the position of aviation in China only a couple of years ago.

Practical interest in aviation in China began in 1909 as a result of exhibition flights given in Shanghai by M. Vallon, a French aviator who subsequently met his death in an accident. In 1910 the General Staff of the Chinese Government tried without success to establish a plant near Nanyuan for the manufacture of aeroplanes, as the result of demonstrations given at the capital by a Russian in a Bleriot monoplane. In the 1911 revolution the southerners ordered two Etrich monoplanes from Austria to use against the north, but these arrived too late to take any part in the hostilities then, and subsequently were transferred to Nanyuan, when General Tsao Kun inaugurated a flying school and workshops, purchasing twelve Caudron bi-planes and engaging two French instructors and two French mechanics. Except that an abortive attempt was made at Foochow to manufacture sea-planes, nothing was done to increase the Government's air-force during the years 1914 to 1919, though it may be mentioned that the reactionary general, Chang Hsun, was bombed out of the Imperial Palace at Peking when he attempted to restore the monarchy in 1917.

In 1919 a revival in aeronautics took place in China when the Government ordered some forty Vimy training machines, sixty Avros and six large Handley Page passenger planes. Although these were originally for commercial purposes, all that had been delivered by that time were commandeered by the military in the 1920 attack of Wu Pei-fu and Chang Tso-lin on the Anfu party, and subsequently divided up, some going to Pao-ting Fu and the rest to Mukden. The Vimy planes had not been delivered, however, and, when they came, went to the Nanyuan School.

By 1921, schools had been established in Pao-ting Fu, Mukden and Canton, the authorities in the latter place purchasing Curtis machines. In the same year an air service was organized between Peking and the summer resort of Pei-tao Ho. This was abandoned in 1924. The war between Wu Pei-fu and Chang Tso-lin in 1922 ending in victory for the latter, further planes were taken to Mukden, those left being ruined by inefficient handling. There were few in working order when Feng Yu-hsiang gained the ascendency, and in 1926, when the last of the Vimy machines were taken to Kalgan, the Nanyuan Flying School ceased to exist. In Mukden, however, Chang Tso-lin developed an air-force, purchasing over 150 planes, while Chang Tsung-ch'ang established a large aerodrome at Tsi-nan Fu. An aerodrome was also established at Lunghwa near Shanghai, while Feng Yu-hsiang, whose army is known as the Kuominchun, had a number of planes. The Nationalist Army under Chang Kai-shek was very poorly equipped as far as aircraft were concerned when it began its victorious advance northward in 1926, but since its success, the new Government has naturally turned its attention to this branch of military and civil transport, and we see the result in the recently announced ten year contract signed by this Government with an American concern, the Aviation Exploration Company, for extensive commercial aerial rights in the country.

CHINA'S OVERSEAS, COASTAL AND RIVERINE SHIPPING

The year A. D. 1516 may be taken as the starting point of shipping in connection with China other than that indigenous to the country, for it was in that year that Rafeal Perestrello, a Portuguese, first reached the coast of China while on a voyage from Malacca, a then recently acquired Portuguese possession. He was followed the next year by Fernao Perez de Andrade, who arrived at the island of San Chuan off the Kwangtung coast, and with two vessels was allowed to proceed to Canton. Owing to the high handed action on the part of Simon de Andrade, the younger brother of Fernao, at San Chuan, where he arrived with a fleet of four ships, built a fort and attempted to rule the natives, the friendly relations established with the Chinese Government by Perestrello and the elder Andrade were destroyed, and from that time on foreign traders and mariners were viewed by the Chinese with suspicion.

Thus inauspiciously began China's maritime relations with the people of the West. As, however, there were certain very distinct advantages in the way of lucrative trade, for the Chinese and foreigner alike, in this intercourse between the East and the West, relations between China and Europe were never altogether broken off. The Andrades and their successors, mainly Portuguese, for a long time practically monopolized the overseas trade with China, in 1557 being given the barren peninsula of Macao as a place where they might reside and establish warehouses and factories.

In spite of attempts on the part of British and Dutch merchants and seamen to participate in the trade with China, the Portuguese held the monopoly till, in 1685, the Emperor Kang Hsi of the Manchu Dynasty, which had superceded the Ming Dynasty in 1644, by an Imperial Decree opened all the ports of the Empire to foreign trade. His action proved precipitate and the foreign trade was once more restricted to Canton a short while after. From then till 1834, the trade, as far as British interests were concerned, was a monopoly of the East India Company, but in that year this company's monopoly was abolished, and a great impetus was given to British shippers to enter the China trade. Meanwhile traders of other nationality had been taking full advantage of the opportunities offered, especially Americans, and many foreign sailing ships were continually entering and leaving the river at Canton. From 1834 to 1860 was a period of conflict between European countries and China, which ended in the opening of what were called treaty ports all up and down the coast and on the Yangtze. This naturally resulted in a great increase in foreign style shipping, which not only carried commerce to and from overseas countries, but forthwith entered into the coastwise carrying trade. The opium trade had developed enormously, and fast ships, called clippers, were engaged in this, most famous amongst them being American ships built at Boston for the trade.

By this time a very flourishing tea trade had developed at Foochow, and we have the romance of what are now known as "the old tea clipper days." The tea clippers were very fast ships, many of them having been diverted from the opium trade, especially engaged in carrying tea from Foochow to London by way of the Cape of Good Hope. They had superceded the older style of tea carriers, which were very slow, as competition had arisen since the East India Company's monopoly had expired, and the various tea companies were naturally anxious to take advantage of the fancy prices that could be obtained in London for the first cargoes of each season to arrive. Still spoken of as an event of outstanding interest in the old tea trade is the famous race from Foochow to London of a number of clippers of which the chief competitors for honours were the *Taeping*, the *Ariel*, the *Serica*, the *Fiery Cross* and the *Taitsing*. On May 30th, 1866, these clippers, laden with valuable cargoes of tea, cleared the mouth of the Min River, having dropped down stream from Pagoda Anchorage below Foochow on the preceding day, on their long run to London. At eight o'clock on the morning of September 6th, exactly ninety-nine days later, the *Ariel* reached the Downs, being followed within ten minutes by the *Taeping*, the rest of the clippers appearing at intervals, and the last of the five arriving on the forenoon of September 9th. A very good account of this race from start to finish is given in Lubbock's "The China Clippers." This was the record run, but the race for the London market was an annual event. Fast ships also carried tea to America, and there was a regular trade in other commodities, including Mexican silver dollars, between that country and China. A very famous clipper of those days was the *Cutty Sark*, other famous vessels being the *Forward Ho*, the *Thermopylae*, the *Falcon* and the *Flying Fish*. Ships in the China trade of those days had to be not only fast but heavily armed, since the China seas were swarming with pirates, and, owing to opium smuggling, Chinese Government craft often attacked suspected foreign vessels. It was thus nearly always a case of fight or run whenever Chinese native craft were seen approaching, and the annals of shipping of those days are full of exciting incidents and adventures. Those were rough and lawless days on the high seas, pirates, slavers and freebooters being very much in evidence, while the various European countries being frequently at war with one another there were always enemies about. There is little wonder, then, that China's relations with the West were not of the happiest. But both these conditions and these early types of vessel were doomed, as far as the China trade with Europe was concerned, for in 1874 the first steamer to carry tea was sent out to China, and from that time on more and more the carrying of China's cargo passed to steam driven vessels, while piracy, buccaneering and smuggling became things of the past. To-day hardly a sailing ship, other than Chinese junks and lorchas, carry cargo to or from China, none being engaged on the coastwise traffic. It is all carried in the holds of steam or motor driven vessels, excepting, of course, the native produce carried by junks.

It has been estimated by Dr. H. Chatley, Engineer in Chief of the Whangpoo Conservancy, that a rough total of something like two million

tons of shipping is now involved in the China trade, coastal, overseas and riverine, of which about half consists of power driven vessels, and half of native craft.

Over fifty shipping companies are now operating in Chinese waters, while the number of steamers of all classes involved is somewhere in the vicinity of four hundred, including only ships regularly employed on the China run from overseas ports or in the coastwise traffic.

There are no fewer than twenty-five regular lines of cargo and passenger steamers linking up China with the rest of the world. Of these more than half are on the Europe to China run, the rest on the trans-Pacific run. There are nearly a hundred good passenger boats, some very luxurious and fast. Of these special mention may be made of the Empress boats of the Canadian Pacific Ocean Services (C.P.R.), the Dollar and President boats of the Robert Dollar and American Mail Lines, respectively, the fine boats of the Peninsula and Oriental Steam Navigation Company, and of the Messageries Maritimes, Lloyd Triestino, Norddeutscher Lloyd and the Hamburg-America Lines. The Prince Line runs several, well appointed fast passenger-freight steamers to New York by way of the Panama Canal. Its fast, fortnightly service includes two motor-driven vessels, the *Cingalese Prince* and the *Siamese Prince*, and three fast turbine vessels, the *British Prince*, the *Imperial Prince* and the *Royal Prince*. The voyage from New York to Manila is done in 49 days, but ample time to spare is shown by the fact that the *Malayan Prince* recently made the run from New York to Shanghai in 38 days.

The excellent services of the C. P. R., are too well known to call for much comment, though it may be mentioned that it runs four first class ships between Vancouver and Hongkong, of which the *Empress of Canada*, 21,500 tons draft, is the largest ship to come up the Whangpoo. The *Empress* of *Japan*, 25,000 tons, will be placed on the Pacific run in 1930. She will connect with the *Empress of Britain* on the Atlantic and make the journey from Shanghai to London in 21 days possible. The *Empress of Australia* is on the round-the-world run. The *Empress of Canada* holds the record for crossing the Pacific, having done the run from Yokohama to Vancouver in eight and a half days, with an average speed of 20.6 nautical miles an hour.

The Robert Dollar Company, besides having its own ships, mainly freighters, with a certain amount of passenger accommodation, are agents in Shanghai for the American Mail Line, as well as for several other freight lines. This enterprising company runs a fortnightly round-the-world service with large comfortable boats. It has a weekly trans-Pacific service, handling large quantities of freight and carrying large numbers of passengers. It does a very extensive business in lumber. The company in Shanghai has its own docks, wharves and godowns, the docks having recently undergone complete overhauling, now being of concrete throughout. It has excellent passenger tenders, launches and numerous other small craft. On one of the company's wharves is a large assembling plant for Ford motor cars. Under the Jones-White Bill, which provides for loans from the United States Government on

liberal terms to American builders, the company is undertaking a big shipbuilding programme. Tentative plans have been made for five large steamers.

The P. & O. Company is the British mail carrying line of the Orient. It runs a series of fine vessels fortnightly from Shanghai to Europe *via* Suez, including the *Ranpura* and *Rajputana*, 16,000 tons, the *Mantua* and *Morea*, 11,000 tons, the *Kalyan*, *Delta* and *Kashgar*, 9,000 tons, the *Nagpore*, 5,300 tons, and the *Lahore* and *Jeypore*, 5,000 tons. The smaller vessels run as an intermediate service. In addition the *Naldera*, 16,000 tons, touches at Bombay, while the *Santhia*, 7,800 tons, and *Tilawa*, 10,000 tons, call at Calcutta. This company has incorporated with it the Apcar Line (B.I.S.N.Co.) from Calcutta to Japan, and the Eastern and Australian Line plying between Hongkong and Australia.

The Lloyd Triestino's fleet of four magnificent ships running between Trieste and the Far East are chiefly remarkable on account of their being motor driven. The *Viminale* and *Esquilino* were completed in 1925, the *Romolo* and *Remo* in 1926 and 1927 respectively. The two latter are of 11,000 tons register, the two former slightly less, but all four have the same speed, 13 knots. These vessels call at Bombay. They are luxuriously appointed, having accommodation for sixty-six passengers and carry a large amount of cargo. This company also has several cargo steamers and a good passenger and cargo steamer, the *Veneza*, on the China run.

Another company that has gone in largely for motor vessels is the Hamburg-Amerika Linie, which has on the China run from Hamburg four large ships of this type with ample fine accommodation for passengers. These are the *Vogtland*, the *Duisburg*, the *Sauerland* and the *Kulmerland*, while the motor vessel *Ruhr* carries only a limited number of passengers. There are also several passenger and cargo steamers.

The well known and long established French mail, the Messageries Maritimes, has an excellent passenger and freight service. This company has been operating for nearly 80 years a fleet of mail and freight steamers plying between France and Great Britain, Indo-China, China, Japan, Australia, New Caledonia (*via* Panama) the East Coast of Africa and Madagascar, as well as the Mediterranean ports of Italy, Greece, Turkey, Syria and Egypt. It also maintains a round-the-world service *via* the Panama Canal. The total gross tonnage of its present fleet is 500,000 tons.

Like other steamship companies it suffered heavily during the great war, but at present its fleet has been almost completely rebuilt. It includes the most luxurious and up-to-date passenger boats, ranging from 10,000 to 24,000 tons, fitted with every modern convenience. Most of these liners are oil burners and so are practically free from soot and ash. They possess recreation and dining rooms for children, smoking saloons, libraries, hair-dressing saloons, reception rooms, steam laundries and private bath-rooms. The cuisine and the wines served on board are unexcelled, and a stringed orchestra plays selections during meals. The mail boats of the Far Eastern line run on a fortnightly schedule.

The Norddeutscher Lloyd, with a service between Japan and Bremen, has a fine fleet of steamers, most of which are fast freighters with limited

accommodation for passengers, though it has two large steamers, the *Coblenz* and *Fulda*, which can carry a hundred first class and a hundred and forty middle class passengers. These are equipped with steam turbines and twin Diesel engines, respectively. The company also runs a number of first-class freight steamers.

A good line of freight motor vessels is run by the Swedish East-Asiatic Company, of which the Ekman Foreign Agencies, Limited, are the agents, from Sweden to the Far East. Of these the *Formosa* is 10,850 tons, while four others are 10,000 tons or over.

The States Steamship Company, agents in China for the Oceanic and Oriental Navigation Company and the Tacoma Oriental Steamship Company, run a good freight service from both North and South China to Pacific coast ports in America.

Other lines running between Europe and the Far East are the Ellerman Line, Anchor Line (East Asiatic Co., Ltd.), the Blue Funnel Line, the N. Y. K. Line and the Glen Line, while the Osaka Shosen Kaisha runs to all parts of the world, and the Australian-Oriental Line between Hongkong and Australian ports.

Probably the best known shipping line engaged on coastwise traffic in the Far East is the Indo-China Steam Navigation Company, of which the old established firm of Jardine, Matheson & Company are the general managers ; in fact the latter firm may well be considered as the pioneers of British shipping in the Orient, dating, as they do, from before the expiration of the charter of the East India Company in 1834. They shipped the first cargo of "free tea" to London in 1836 in the *Falcon*, a fully rigged warship originally belonging to the Earl of Yarborough, commodore of the Royal Yacht Club. During the "tea clipper days" this firm owned many a famous ship of the clipper type, but did not hesitate to discard them for steam vessels when the time was ripe, and in due course the line of steamers with the well known red funnels came into existence. The Indo-China Steam Navigation Company was formed as a separate company in 1881, with the old firm as managers, and it now owns thirty-eight passenger and cargo vessels (aggregate gross tonnage 118,031), with services from Calcutta to Japan, all along the China coast and up the Yangtze as far as Chungking.

One of the leading companies plying on the Yangtze, especially in the rapids section above Ichang, is the Yangtze Rapid Steamship Company.

An important line of steamers on the China coast is the Dairen Kisen Kaisha, specially serving the ports of Tsingtao and Dairen. Other companies in the Far East coastal and Yangtze shipping business, are the China Merchants, Butterfield and Swires, the San Pei Company and several other Japanese and Chinese companies. The last have suffered very severe losses during the past few years owing to the disturbed state of the country.

TRANSPORTATION NOTES

SEVEN TIGERS BAGGED IN INDO-CHINA WITH THE HELP OF MOTOR VEHICLES : What can be accomplished with the help of the motor car and trailer in the way of big game hunting has recently been abundantly demonstrated by two China coast sportsmen, Mr. Ernest Edgar of Newchwang and Mr. Rowland Bandinel, formerly of the Russo Asiatic Bank. Readers of " Shooting Notes " in this journal will be familiar with the splendid shooting that is to be had in Indo-China, as we have published accounts of this as well as photographs of the bags made by various sportsmen in those regions from time to time, but we believe that the present account of a two and a half months' trip by the two sportsmen just mentioned will eclipse anything else that has been published by us or any one else on the subject.

After having visited the country in which they intended to hunt a number of times and having familiarized themselves with conditions there, they prepared their last winter's campaign with great care. Realizing that mobility was one of the all important factors of success in their determination to secure their tigers, which was what they were chiefly after, they hit upon the plan of taking their own motor vehicles with them. For this purpose Mr. Bandinel shipped his car, a Fiat, to Saigon, while a two-wheeled trailer of French make (since this would be duty free) was ordered from Paris and arrived in due course. It must be explained that the French authorities have built excellent motor roads all through Indo-China, in many areas penetrating the heart of the jungle.

The two sportsmen had already decided on the particular piece of country they were going to hunt in, and on December 11 last, with tents, stores, ammunition and other gear, and accompanied by a Chinese " Snipey " from Tientsin, a cook and a *Banta*, as a Moi chief is called, supplied by the authorities as a sort of guide and guard, they left Saigon. In less than a day's run they had reached their chosen field of operations, stopping for a couple of days at a friend's bungalow, and then going into camp. The area they had chosen was traversed by a thirty-five kilometres stretch of road, and during the whole of their shoot they stuck to this road, which they traversed daily in the car, hardly once leaving it more than a quarter of a mile or so.

The plan of campaign was to set a number of " kills " out as bait for the tigers, building what are there called *miradors* over the " kills," which were examined every day. If it was found that one had been touched by a tiger, one of the sportsmen and a native would take up his position in the *mirador* over it early in the afternoon and wait till it was dark. At about seven or eight o'clock the other sportsman accompanied by natives and showing lights would come and fetch the watcher back to camp. It was soon found that the country was full of tigers, and the method just outlined proved very successful. Previous experience had taught the sportsmen that the tigers came to the kill as often as not in broad daylight, so it was decided to concentrate on daylight shooting and not on the far less certain night shooting, which required the use of electric head-lamps.

The bait used for the tigers consisted of the carcases of game, chiefly sambur, which were very numerous, although wild pigs, muntjacs and gaur were also used. Gaur were not shot for this purpose, however, only the deer.

By this means no fewer than seven tigers, or rather, six tigers and a tigress, were bagged, while at least a couple that were hit got away and two or three were missed altogether. It would have been utterly impossible to cover the ground necessary in inspecting the kills daily, in shooting bait, and in going to and from the *miradors* over kills that had been touched without the motor car, while the trailer proved invaluable in shifting the heavy gear about.

While the sportsmen concentrated mainly on tiger hunting, they took time off to do a bit of other shooting, Edgar bagging a fine gaur that was almost a record, a second smaller gaur, wild pigs and some sambur stags with fine horns also being bagged. On one occasion, while proceeding along the road in a dense mist, they almost ran into an elephant that was quietly walking along in front of them. They also devoted a couple of days to hunting a herd of elephants in the vicinity. Once they got right into the middle of the herd in long grass and reeds, but dared

not fire for fear of being trampled to death by the herd if it was thrown into a panic. On March 1, they broke camp and returned to Saigon after what is unquestionably the most successful tiger hunt we have ever heard of. The most interesting point that comes to light from their experiences is the fact that in wild country such as the Indo-China jungle, the tiger will go to a kill and start feeding in daylight. One of the tigers killed was shot early in the afternoon, long before dusk, while almost all that were encountered came before it was dark.

ANTELOPE AND BUSTARD SHOOTING FROM MOTOR CARS: Readers of this issue of the *China Journal* who are not regular subscribers may be referred to the last issue (April), in which under "Shooting and Fishing Notes" appears an interesting account of shooting antelopes and bustards with the use of motor cars. The Mongolian antelope or gazelle is such a fast animal that it cannot be overtaken by a man on horseback, while, living on the flat plains and being extremely alert, it is practically impossible to stalk it. The motor car enables the sportsman at least to come within range and get in his shot, as well as to cover sufficient country for him to pick up and chase several different herds, all of which is impossible by any other means. Very much the same applies to bustard shooting, the motor car enabling the sportsmen to get up close to the birds before they take wing. They do not seem to mind the car until it is almost on top of them. The bags mentioned in the letter referred to were eight gazelles and thirty-three bustards.

USE OF MOTOR VEHICLES IN EXPLORATION WORK: Anybody who has followed the recent trend of field work and exploration carried out by scientists will have realized how essential the motor car and motor lorry are becoming in this line of work. There is hardly need to call to mind the brilliant achievements of the recent Mongolian Expeditions of the American Museum of Natural History under Dr. Roy Chapman Andrews, which could not have been accomplished without the aid of motor transport. While the bulk of the heavy outfit, gear and supplies was sent on well ahead by camel caravan, the personnel of the expeditions, their tents and personal baggage and necessities were carried by cars and lorries, crossing the deserts and overtaking the slow moving caravans in a few days, thus cutting out an enormous amount of hardship and fatigue which otherwise would have had to be endured, and must, in the end have impaired the work of the explorers.

But Mongolia is not the only desert country that has been conquered by the motor vehicle. We have received an interesting note from Messrs. Thornycroft's representative here of a regular motor route across the northern part of the Arabian Desert from Beirut to Bagdad which is traversed at all times of the year by their famous six-wheeler lorries. The distance is 580 miles, but it must not be imagined that it is all dust and sand. About seventy-five miles of it is down the valley of the Euphrates, where the tenacious mud gives a great deal of trouble, while nine-tenths of the rest of the route is over soil which consists chiefly of a top layer of hard mud or rough small pebbles on a limestone foundation. Where the mud has been washed away on the higher ground only the crumbled limestone appears, but in the valleys and where the ground is flat there is often a considerable depth of mud, and naturally after rain this mud becomes very soft. It will thus be appreciated what it means for these heavily laden lorries to cross this stretch of country at all sasons of the year in the service inaugurated by the Nairn Transport Company. Here is an excellent example for the Chinese to follow, since there are many stretches in this country which could be successfully traversed in the same way.

It is not long since the Kalahari Desert was crossed by a party of British explorers using British six-wheeler lorries, while some extraordinary tests have been made in other parts of the world with Thornycroft machines. One, an "A3" loaded with two and a half tons, went from San Paulo to Presidente Wenceslau, a distance of about 1,000 kilometres over the roughest country without proper roads, was accomplished in some seven days, an astounding feat, all things considered.

An American vehicle that has accomplished great things in the way of rapid transport across rough country where improved highways are non-existent is the new six-speed "International Harvester" truck. This vehicle has a high range with three speeds for fast work on good roads or across flat country, and a low range with three speeds for hilly and bad country of every description. In low range, low gear, the truck speed is decreased from thirty-five to three and a half miles an hour, providing an increase in power at the rear wheels ten times that at high speed. This assures unusual ability to get out of holes, cross fields, climb hills and traverse sandy and other difficult places.

It is vehicles like these that are of such valuable assistance to scientists in their explorations in out-of-the-way parts of the world, although, of course they have really been designed to serve commerce and industry. Their value in pioneering in countries such as China can hardly be estimated.

HYDRO-GLIDERS ON THE CHIEN T'ANG RIVER: In the accompanying illustration are shown two of the hydro-gliders in use on the Chien T'ang River. There are four of these craft already in use, two large and two small. The engines are of American make, aeroplane type, 150 H. P. for the larger craft and 100 H. P. for the smaller craft. Their maximum speed is 20 miles an hour. The hulls which are of wood with rivetted seams were built at Zahkow and the boats commenced operations in January, 1929. The larger type has accommodation for 30 passengers and the smaller type for 20 passengers, seated along the sides with a table between them. The engines are mounted at the rear of the boats. The fuel consumption is 12 gallons of benzine and one gallon of lubricating oil for the larger type, and half these quantities for the smaller type per hour. Two more craft are now being built and the engines have already arrived. It is proposed eventually to bring the number of craft up to twelve. The Company operating them is the Ta Hwa Navigation Co. of Hangchow. The larger type draws 6″ empty, 8″ loaded and stationary and 4″ when running; the smaller type 4½″, 6″ and 3″ respectively. The services so far opened are:

Hangchow	— Lanchi — Changshan	160	miles
,,	— Tunki	170	,,
,,	— Huchow— Wusih	120	,,

Meals are provided on board, the upstream fare, Hangchow-Lanchi, being $6.20 including food, and the downstream fare, Lanchi-Hangchow, $4.40.

KEEPING THE OMNIBUS SERVICE EFFICIENT: Maintenance of a fleet of vehicles is the most important task which confronts the passenger service operator. Arrange he his time schedules and fare-tables never so wisely, without reliable vehicles his labour is lost. It should be of interest, therefore, to the general public to learn something of the methods employed which enable the modern bus operator to maintain his service regularly and punctually, so that the following notes regarding the China General Omnibus Company, which operates in the International Settlement of Shanghai, may not be out of place. This Company's spacious garage is situated at No. 263 Connaught Road, where accommodation for the Company's whole fleet of 75 buses is provided, occupying a space of 24,200 square feet, in addition to well equipped machine, electrician's, coppersmith's, carpenter's and blacksmith's shops, as well as large store and paint rooms.

The buses are kept in tip-top condition, and, to achieve this, a schedule of maintenance is gone through each night of which a short description follows. In addition to these operations are the day-docking and overhauling programmes, in accordance with which each bus is docked for one day each month or longer if found necessary, and is completely overhauled annually. During the latter operation the body is lifted off the chassis, the engine, dynamo and motor are removed, wheels and axles are taken off and spare parts are fitted in their places. During

the time occupied by this work the body is renovated and repainted, and the vehicle returns to duty on the routes a few days later in as good condition as a new bus.

The parts taken from it when it came in for overhaul are taken down, cleaned, repaired and reassembled, so that by multiplication of spare parts most of the work of overhaul is accomplished while the bus for which the renovated parts are destined is still on duty on the routes. The ordinary maintenance routine is undertaken almost entirely at night, and occupies the attention of a small army of fitters, electricians, greasers, cleaners and coolies, all under the direction of a foreign superintendant. Buses returning from route duty from 10.30 p.m. on are replenished with gasoline on arrival and the tyres of the later types are inflated with air. The bus is then shunted into position, and in this connection a word of appreciation of the wonderful skill of the shunters is not out of place. These men acquire extraordinary accuracy in handling buses, and this will be realized when it is understood that when all buses are housed for the night there is just sufficient room for the maintenance staff to move round them in the course of their duties. They can back their buses into position to within an inch, and even the slightest accident to a bus while under their control is practically unknown. Once the bus is in position, the real work of testing it's efficiency rapidly proceeds. Wheels are jacked up, tested for alignment, extraneous matters are removed from the treads of tyres, and brakes are tested and adjusted as found necessary. Compression is tested, spark plugs cleaned and adjusted, dynamos, motors, magnetos, in fact, all parts of the vehicle come in for a share of attention. While the fitters are thus employed the greasers are busily engaged applying oil and grease as laid down in carefully compiled schedules, and simultaneously the work of thoroughly cleaning and disinfecting the body is proceeding. As the maintenance schedules call for examinations and operations numbering something over 6,000 nightly, it will be to some extent realized what an enormous amount of care and supervision is necessary to get the work done efficiently, especially as it can only be done at night when the vitality of workmen and supervisors is at it's lowest ebb. A particularly interesting machine is the Hutto Grinder—believed to be the only one of its kind in China—which is used for grinding out slightly worn cylinders. This is done to a thousandth of an inch and after the job is completed the cylinder is as good as new except that it requires a slightly larger piston ring or in the case of more heavily worn cylinders an over-size piston. The Company expects very shortly to be in a position to undertake work of this type for the general public.

Turning to the traffic side of bus operation in Shanghai, the record of this company is one of steady progress. One of the most recent efforts to meet further requirements is the inauguration of Express Services. These are operated on various routes on the principal that passengers who care to pay a reasonable sum for transport are entitled to reasonable comfort in return.

The latest type of Tilling-Stevens gear-driven vehicle is used. They are comfortably upholstered and no standing is permitted.

The fare charged is twenty cents big money per trip for any distance and it is gratifying to learn that the public are showing their appreciation of the efforts made to meet their requirements by patronizing these services. It is hoped to increase them as the exigencies of traffic require.

The Company welcomes suggestions from the public for the improvement of their services, for it is their aim to meet the convenience of passengers to the fullest possible extent.

AN ASTOUNDING USE FOR OLD MOTOR TYRES: Travellers in the Gobi Desert are aware of the fact that the Mongols, in order to save the soles of their camels' feet in country where the surface consists of sharp stones and gravel, sew leather pads on to the animals' feet. During the Mongolian Expeditions of the American Museum of Natural History headed by Dr. Roy Chapman Andrews, both motor cars and camels were used for transport. While watching the process of changing tires on one of the cars, Iserin, the Mongol camel leader, got a brain wave. He asked for the old tyre and forthwith proceeded to cut out suitably sized patches, which he used as sole-pads for the camels, finding this new material

far superior to the raw hide hitherto used. The tyres used on these expeditions were U. S. Royal Cord, and in a letter by the leader appearing in the *U. S. Tyre Retailer*, he is full of praise for their serviceableness.

A PLEA FOR THE NARROW GAUGE RAILWAY: While everybody agrees that the development of China is possible only through better means of communication, discussions are going on as to the best way to create such transportation facilities. Many people are in favour of building motor roads in order to have the service of motorbusses all over the country.

While it is true that the construction of a motor road—especially when it is an ordinary mud road without stone surfacing—costs comparatively little it must be admitted that the upkeep of roads, not to mention the upkeep of the motor cars, is rather expensive, and, under actually existing circumstances, not always economical. Motor cars use gasolene or kerosene as fuel, which material has to be bought from foreign countries.

Others recommend the building of railways, which alone, as they point out rightly, will allow of the economical transportation of large quantities of coal, mineral, agricultural products and passengers, The adherents of the railway system also point out that steam-driven locomotives use coal as fuel, and that the consumption of coal on the railways gives work to labourers in the mines, so that through the expense of the railways other sections of the population than railway workers are benefited.

Against the plan to build all over China standard gauge railways is the tremendous initial outlay involved, a very serious consideration in the present state of the country's finances. A way out of this dilemma is the construction of narrow gauge light railways of, say, 600 m/m to one metre. Provincial authorities as well as private enterprises have found that the narrow gauge railway gives them wonderful service. They have seen that all over Europe, over India and Japan many thousands of miles of such light railways exist and are giving extraordinarily good service. Chinese mining concerns have started to build such railways for transporting their coal and ore either to the nearest river or to the nearest standard gauge railway, and the old method of transporting in small baskets by coolies or donkeys has been abandoned. Once these railways have been established, the people have wanted to profit by them, and now passengers also to the extent of many thousands are transported over them. Following this example, cities which are situated some distance from the standard gauge railways have built similar light lines to connect them with the main lines. Last, but not least, the light railway has come to stay in regard to the development of outlying districts with only small populations, where the building of standard gauge railways would not be justified. If one considers that the saving in a narrow gauge railway over a standard gauge railway is something between 40 and 70 per cent., one can easily understand the favour which the narrow gauge railway has found in the eyes of people who want things to be done in an economical way. To-day, perhaps, 1,000 miles of light railways are in use all over China, and we believe that this figure will be increased considerably once the Chinese have put their house in order and start the development of the rich sources of their country in an economical way.

ALL TRANSPORTATION COMPANIES ARE INTERESTED IN MAINTAINING THEIR VEHICLES FREE FROM BREAKDOWNS

ONE WAY OF ENSURING THIS IS TO USE
ONLY, GENUINE

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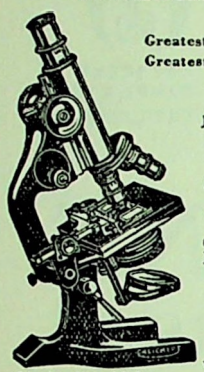

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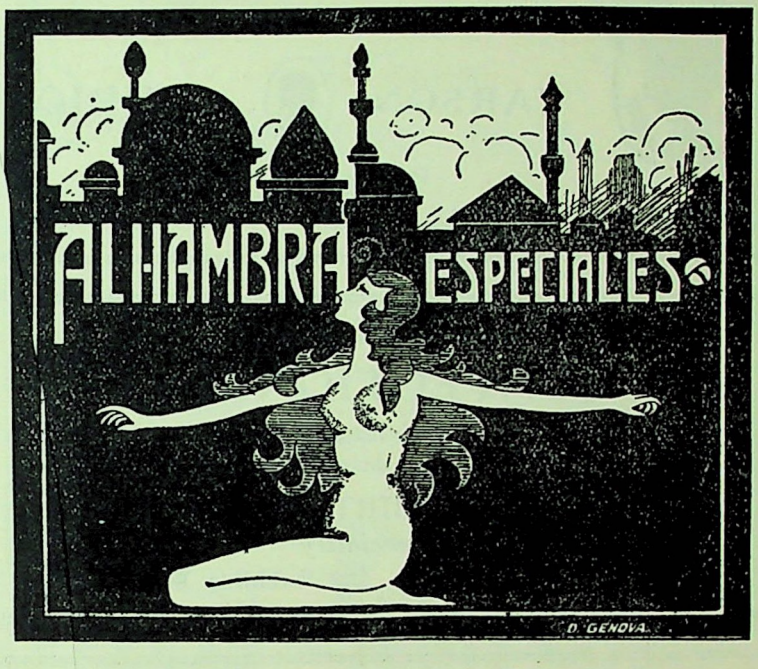

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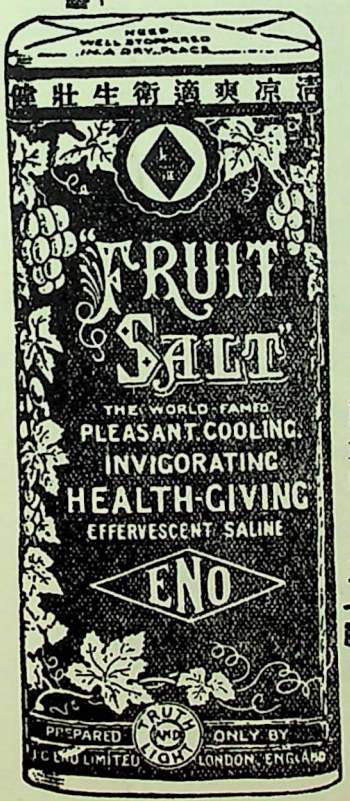

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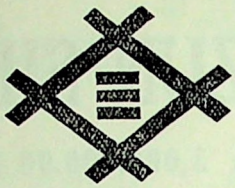

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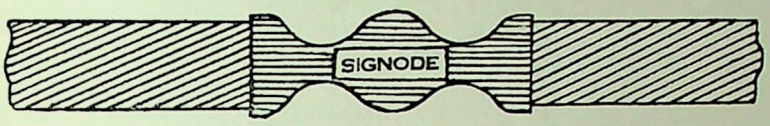

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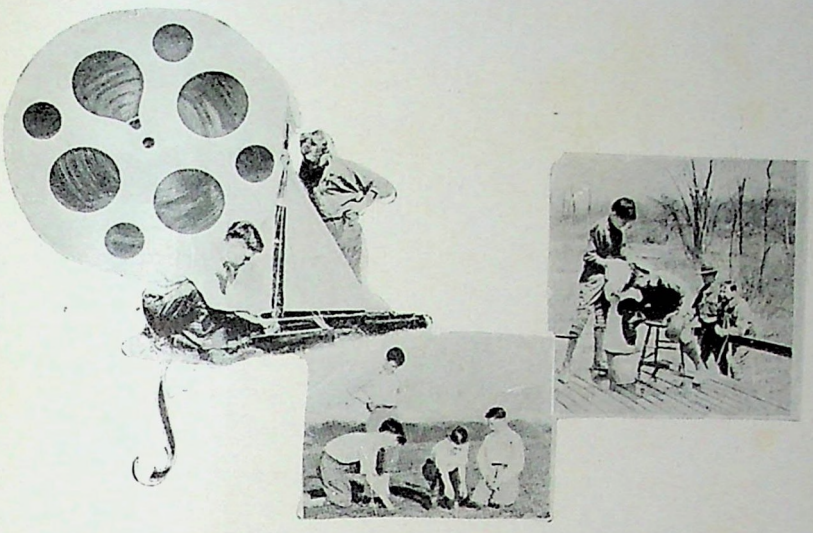

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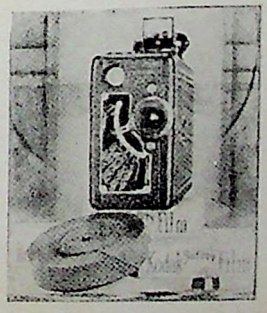

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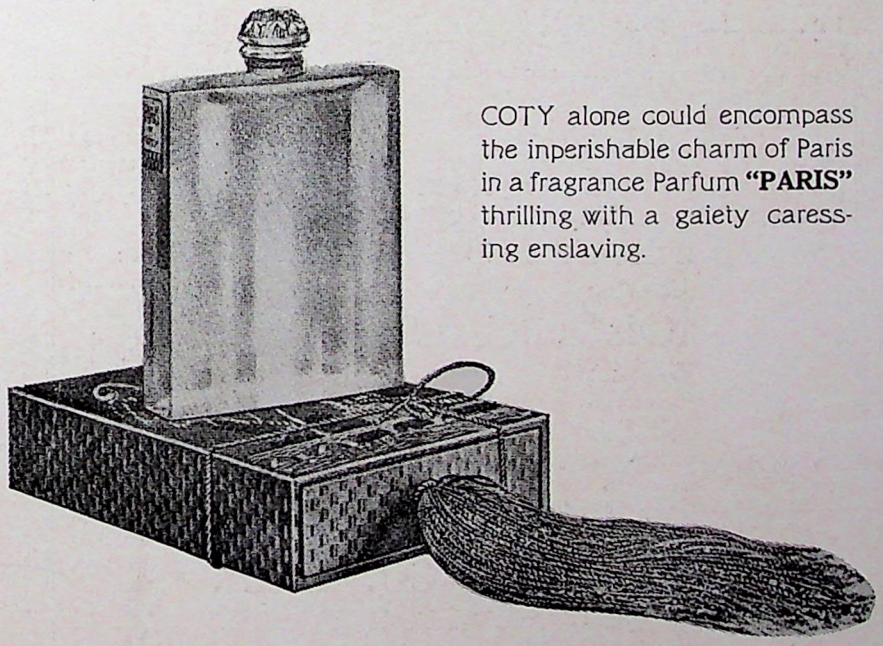

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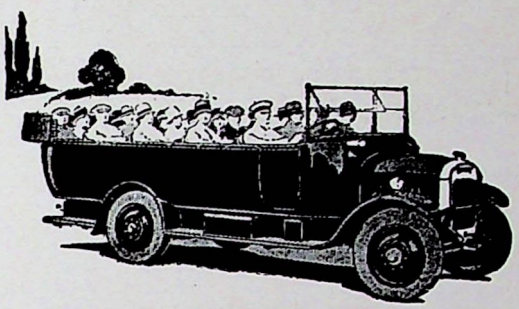

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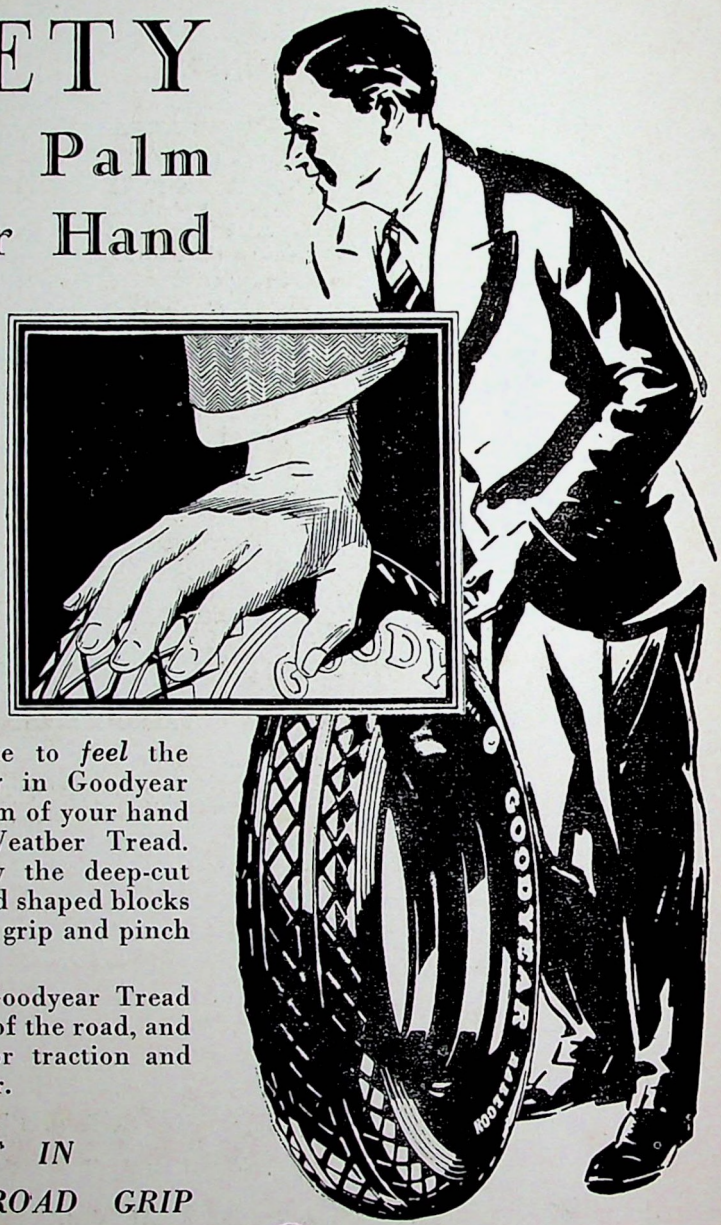

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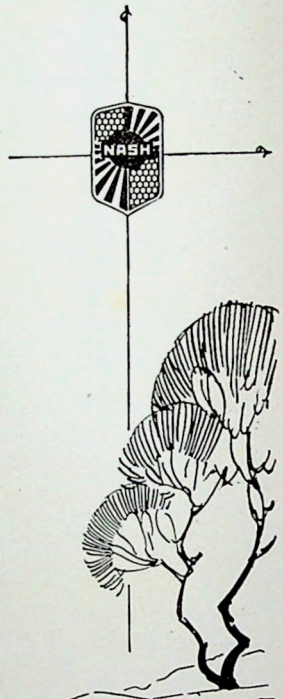

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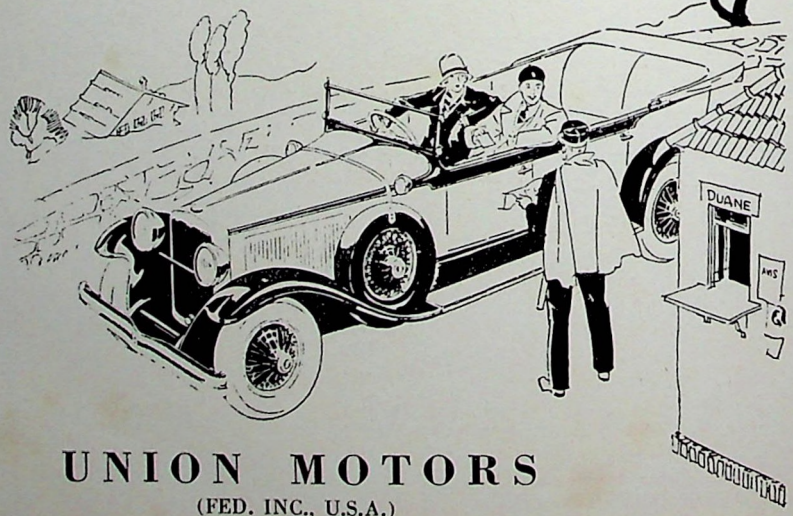

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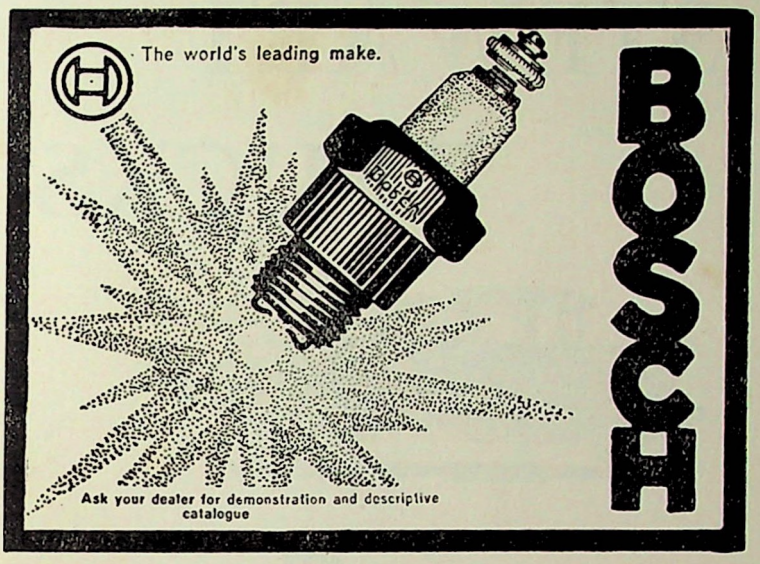

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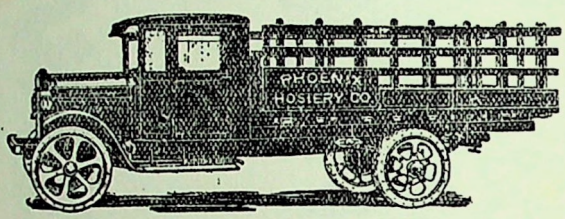

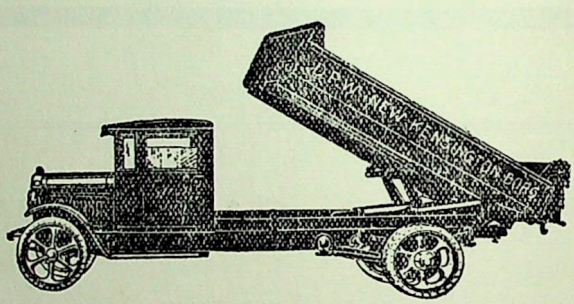

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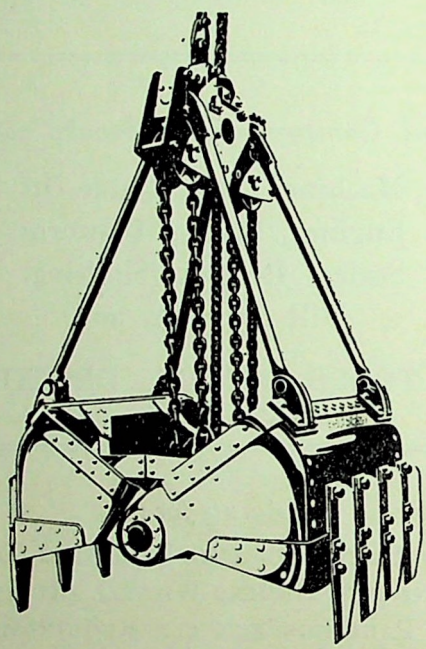

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