Obituary

ENGINEER VICE-ADMIRAL SIR REGINALD SKELTON, K.C.B.

We record with regret the death of Engineer Vice-Admiral Sir Reginald Skelton, which occurred, on September 5th, at Meadow Cottage, Aldingbourne, Sussex. Sir Reginald, who was eighty-four, was Engineer-in-Chief of the Fleet from 1928 to 1932.

Sir Reginald, who was the third son of Mr. William Skelton, of Long Sutton, Lincolnshire, was born in June, 1872, and was educated at Bromsgrove School before joining the Royal Naval Engineering College at Devonport in 1887. In 1892, after completing the course, he was appointed assistant probationary engineer and during the next eight years served in a number of ships. Sir Reginald's next appointment was to superintend the building of "Discovery" for the National Antarctic Expedition and he was chosen by the late Captain Scott to accompany the expedition as chief engineer of the ship. For six years, from 1906, he was engaged in the submarine service, and then he served in H.M.S. "Superb" until the outbreak of the first world war, when he joined H.M.S. "Agincourt," with the rank of Engineer Commander. Admiral Skelton was present at the Battle of Jutland and was awarded the D.S.O. and also the Russian Order of St. Stanislas for his conduct on that occasion. In the succeeding years he served as Fleet Engineer Officer, Mediterranean Station, and then in the same capacity in H.M.S. "Elizabeth" on the Atlantic Station. He continued to advance in his career and became Engineer Rear Admiral in 1923, and Engineer Vice-Admiral in 1928 upon his appointment as Engineer-in-Chief of the Fleet. He relinquished this appointment upon his retirement in 1932. In 1936,* he joined the board of directors of John I. Thornycroft and Co., Ltd., and continued to be associated with the company until his death.

SIR RALPH WEDGWOOD, Bt.

Sir Ralph Wedgwood, whose death occurred at Leith Hill Place, near Dorking, on September 5th, at the age of eighty-two, will be remembered by his long and distinguished career in railway management and operation. He was general manager of the London and North Eastern Railway Company from its formation in 1923 until 1939.

Sir Ralph was educated at Clifton and at Trinity College, Cambridge, and joined the North Eastern Railway Company in 1896. He spent three years in the dock superintendent's office and then became an assistant in the general traffic manager's office. In 1902, Sir Ralph was appointed district superintendent at Middlesbrough. For a short time subsequently he was secretary of the North Eastern Railway Company, and in 1911 he became assistant goods manager at York, afterwards succeeding Sir Eric Geddes as chief goods manager. In the first world war, Sir Ralph was Director of Docks in France. After the war he returned to the North Eastern Railway as general manager. With the grouping of the railways in 1923, Sir Ralph was appointed chief general manager of the London and North Eastern Railway, a position which he relinquished in 1939 when he became chairman of the Railway Executive Committee. Among his many other services, Sir Ralph was a member of the Weir Committee on main line electrification (1930–31) and a member of the Central Electricity Board from 1931 to 1946.

Parking in the U.S.A.

No. I

By H. J. H. STARKS, B.Sc., Ph.D., D.I.C., F.Inst.P*.

The rapidly increasing number of vehicles in use in the United States of America is creating serious parking difficulties in many cities. One of the consequences is the development of suburban shopping centres, and this is having serious repercussions on the commercial activities of the central business areas. To counteract these trends and to meet the insistent demands for more parking accommodation, some cities are making great efforts to solve their parking problems. This article considers the parking problems in American cities and describes some measures directed towards their solution. These include the use of parking meters for steet parking, off-street parking sites, multi-storey open-deck garages with ramps or hoists for inter-floor movement, large underground car parks, mechanical parking of cars, car storage on the roof or upper floors or in the interior of buildings, and fringe parking. Information is given on the costs of providing these facilities, on the charges made for parking and on the methods used for enforcing the parking regulations.

THE answer to the question "Where can I park my car ?" is one which presents many Americans with a daily problem, often involving inconvenience and delay. The recent rapid growth in the number of cars has created an increased demand for parking space, and much of this has had to be met by street parking, leading to greater traffic congestion, particularly in the business and shopping areas of cities. The conflicting requirements of shoppers who wish to park for short periods, of business people who wish to park all day and the demands of moving traffic make the parking problem one of great complexity.

Fig. 1—Parking sign in Washington, D.C.

The Federal Aid Highway Act of 1944 encouraged cities to improve their main arteries by providing money for this purpose from Federal funds ; these funds, however, could not be used to build car parks. Parking facilities have had to be provided from the cities' own resources or by private enterprise, and it is obvious that insufficient money has been allocated for this purpose. One of the consequences resulting from inadequate parking space has been the growth of suburban shopping centres, where ample parking facilities, often free, cater for the needs of many who formerly shopped in the central areas of the city. The financial repercussions on the shops and stores in the central area have, in some cases, compelled large stores to close or to move to one or more suburban sites ; property values in the central area have in consequence declined appreciably. The central areas of cities are, however, still the hubs of commercial activity, and municipal authorities are realising that active steps must be taken to provide more parking facilities if a further decline is to be avoided. As a result, many American cities are carrying out surveys of their parking requirements and are preparing plans or taking immediate action to meet them.

Parking difficulties are not confined to American cities, but are being experienced in most large cities in Britain and in other countries. The way in which the parking problem is being attacked in the United States is therefore of special interest. This article describes some of the measures taken in the United States and is illustrated by photographs taken by the author during a visit to the United States in 1954–55.

The Parking Problem in American Cities

The parking problem in the United States, compared with that in other countries, is aggravated by the following factors :—(1) There are more cars per head of the population—there are about 55,000,000 cars or about one car for every three inhabitants ; (2) American cars are longer and wider than most common makes of car in other countries ; (3) most Americans prefer to use their car even if this means inconvenience and delay ; as a result, public transport companies cannot offer as good a service as they might wish, except by charging exorbitant fares ; this in turn tends to encourage people to use their cars rather than public transport ; (4) few shops deliver goods and therefore shoppers have to use their cars to take home purchases, particularly groceries ; (5) many car owners do not possess a private garage and many who have do not use it ; most people leave their cars in the street. On the other hand, the streets in most cities in the United States are much wider than in Britain, so that cars parked at the kerb do do not cause the same degree of congestion as in Britain.

The magnitude of the demand for parking space in most cities in the United States is obvious even to the most casual observer. Both sides of streets on which parking is not prohibited are usually lined with cars (Fig. 2) and off-street parking accommodation is frequently filled to capacity. The

* Road Research Laboratory, Department of Scientific and Industrial Research.

Fig. 2—Street parking in Washington, D.C. (N. St., N.W.)

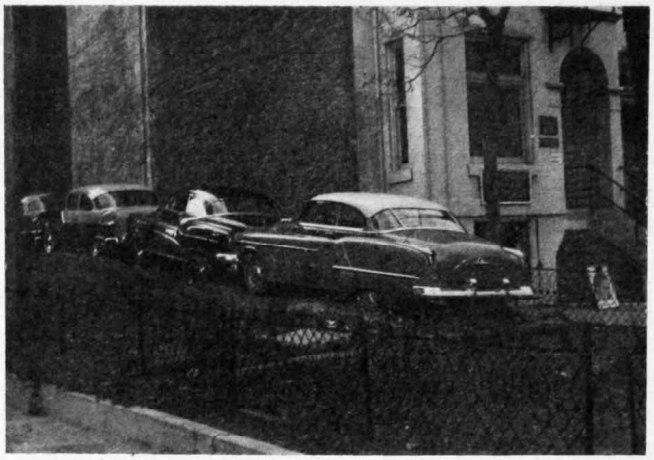

Fig. 3—Parking on space between buildings, Washington, D.C. (K. St., N.W.)

ground between buildings (Fig. 3) and the yards at their rear (Fig. 4) are also often filled to capacity. In most cities the regulations governing the places where cars may be parked and the duration of parking are clearly displayed, but in spite of this the number of offences for street parking greatly exceeds that of all other traffic offences combined. In Washington, for example, drivers prosecuted for parking offences numbered 30,000 in 1954 and about 50,000 in 1955. It is interesting to note that in 1954 about 30,000 people were prosecuted and 28,000 received written warnings for obstruction in the London Metropolitan Police District.

In Pittsburgh all street parking is prohibited in the business area between 7.45 and 9 a.m. and between 4.30 and 6 p.m., except to pick up waiting passengers ; during the rest of the day parking is limited to ten minutes. This regulation is strictly enforced and cars exceeding this period are liable to be towed away by the police at the owners' expense. In many cities street parking is permitted in most streets, but, except at weekends, the maximum permissible parking period in the business area during the day rarely exceeds two hours. Most cities have regulations forbidding the construction of new office or apartment buildings or large stores unless certain prescribed parking facilities are provided. In spite of these regulations, however, acute parking difficulties are encountered near some of the newly erected apartment buildings.

Parking Facilities

Street Parking—In the United States, as in other countries, there are restrictions on parking in the streets of cities. These restrictions are much more clearly signposted in American cities, and signs are often put up at intervals of a few yards (Figs. 1 and 6). A visitor from abroad is usually struck by the veritable forest of signs relating to parking. Although many American drivers are prosecuted for overstaying the permitted parking period, few are prosecuted for obstruction by parking in streets in which there are no signs regarding parking, as is often the case in Britain. Apart from streets where it is permissible to park a vehicle at the kerb, clearly defined parking spaces are provided in many city streets ; these usually have parking meters (Fig. 5) ; there are over 1,000,000 of these in use in the States.[1] Generally, there is one parking meter for each parking space, but in some municipal car parks one meter caters for every two vehicles. A coin is inserted in the meter and this starts a clockwork mechanism which shows the unexpired time on a scale. A red indicator appears when the permitted time limit has expired. The charges vary considerably, ranging from about 5 cents per hour to 40 cents per hour. In some cities, provision is made for short-period parking by charging 1 cent for each twelve minutes, the driver inserting the appropriate number of coins depending on the time he expects to park. In some cities, the revenue from parking meters is used to provide more off-street parking facilities ; in others, particularly the smaller cities, it merely provides an additional source of income.

If parking meters are to serve their proper purpose, it is essential that there shall be a proper system of enforcement. This sometimes presents a difficult problem in cities where there are several thousand meters. In Washington, police patrols

Fig. 6—Parking sign in Pittsburgh, Pa.

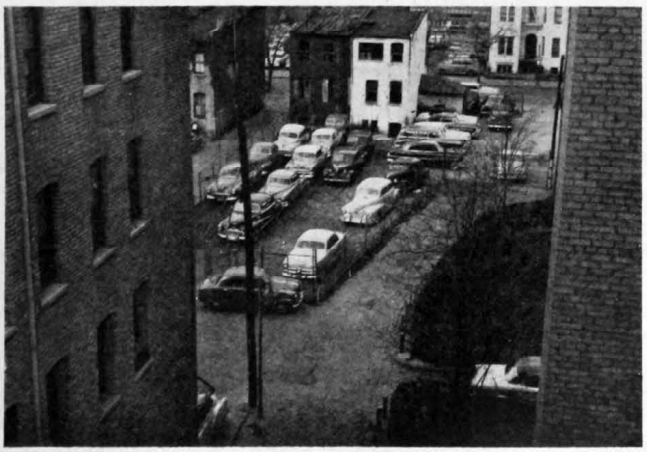

Fig. 4—Parking in yard at rear of office buildings, Washington, D.C. (K. St., N.W.)

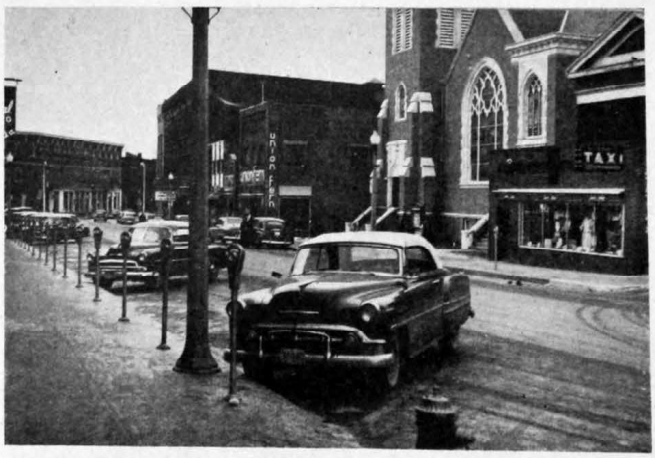

Fig. 5—Parking meters in Bennington, Vt.

Fig. 7—Off-street parking lot in Washington, D.C. (Connecticut Avenue)

Fig. 8—Off-street parking lot with hydraulic hoists, Washington, D.C. (G. St., N.W.)

mounted on motor-cycle combinations periodically inspect the parking meters. Although the insertion of coins in a parking meter allows a vehicle to be parked for a stated time, there is nothing to stop the driver from inserting more coins before or when the allotted time has expired. In some cities, the police periodically mark the tyres of parked cars with chalk to detect those who offend in this way. Most parking meters require the use of 1 or 5 cent coins. Shopkeepers in several cities have complained that they are continually pestered by drivers requesting change. In one large municipal park, it was found that the provision of a change-giving machine resulted in a 60 per cent increase in the daily sum collected from the parking meters.

Where the street is wide enough and the traffic conditions permit, parking meters are usually arranged for diagonal parking, usually at an angle of 45 deg. or 60 deg., and vehicles drive in and reverse out. The spacing of the meters is usually about 10ft for diagonal parking and about 24ft for parking parallel to the kerb. It has been found to be desirable to mark the parking stalls, especially when diagonal parking is used. A study made in Washington by the American Automobile Association[2] showed that the average time taken to park at the kerb with no stall markings was about thirty-eight seconds, but to park in marked stalls, the average time was about twenty-two seconds. The time taken to unpark from marked stalls was also shorter.

Off-Street Parking Lots.—In cities, parking areas or lots are open spaces on which the maximum number of cars is crammed. Their appearance is seldom attractive (Fig. 7), and were it not for their useful function in getting vehicles off the streets they would probably not be tolerated. Access to the site is often restricted or vehicles have to cross the pavement, and the removal of a car usually requires the moving of several other cars. Generally, an attendant takes delivery of the car at the entrance of the lot and delivers it again when the driver requires it. Cars cannot usually be locked by the owner. The attendants are skilful in parking vehicles and although complaints are seldom made about damage, the treatment vehicles receive is probably rougher than many car owners would like. These are some of the inconveniences which drivers in the United States suffer because of the inadequacy of parking space. So great is the demand in some cities that some parking lots in the business areas are now resorting to elaborate devices for increasing parking space. For example, hydraulic hoists of the type usually employed in service stations are being used to double the number of cars that can be stored on a given area (Fig. 8); the first cars to arrive are lifted up by the hoists and later arrivals are parked underneath, so that there are two rows of cars, one above the other. The great demand for parking is an incentive for property owners and others to provide parking space when, for example, a site has been cleared in preparation for new building construction. This affords a welcome, even if temporary, addition to the parking facilities.

Although the layout of most parking lots can hardly be said to have been designed, some cities have made regulations or recommendations regarding the minimum widths of access. In New York, for example, the following minimum widths of the entrance and exit are recommended :—

Size of parking area :	Minimum width of entrance and exit :
24 spaces or less	One 8ft lane
25–50 spaces	One 10ft lane
51–300 spaces	Two 10ft lanes
For each additional 150 spaces (or fraction thereof)	One additional 10ft lane

A review of the off-street parking requirements for new buildings considered desirable by the local authorities of some forty cities is quoted by The American Automobile Association[2] as follows :—

Type of building :	One parking space required for each :
Theatres	7 seats
Retail business	400 square feet
Office buildings	450 square feet
Industrial buildings	3 employees / 750 square feet
Restaurants	5 seats
Hotels	4 guest rooms
Single dwellings	1 unit
Multiple dwellings	1½ units

The requirements differ considerably in different cities and the above figures are quoted as averages. Detailed information is given in a publication by the Highway Research Board.[3]

The New York Regional Plan Association[4] makes the following recommendations regarding street loading bays for commercial

Fig. 9—Parking on waterfront, Pittsburgh, Pa.

Fig. 10—Parking on waterfront, Pittsburgh, Pa. (Note large parking areas round office buildings)

vehicles serving department stores, warehouses, office buildings or hotels :—

Number of off-street loading berths required	Square feet of gross floor area each berth can serve in '000s of square feet	
	Department stores, warehouses	Office buildings, hotels
1	25	100
2	42	168
3	52	208
4	59	236
5	65	260
10	78	312

Loading bays at street level for commercial vehicles to deliver or pick up goods at berths constructed inside large stores may now be seen, for example, in Chicago ; access is by archway or tunnel from the street. The provision of parking and loading facilities for long-distance coaches and for public service vehicles at terminal points is also receiving attention. The Port of New York Authority's bus terminal in New York is perhaps the best example. There are also excellent underground bus terminals in some

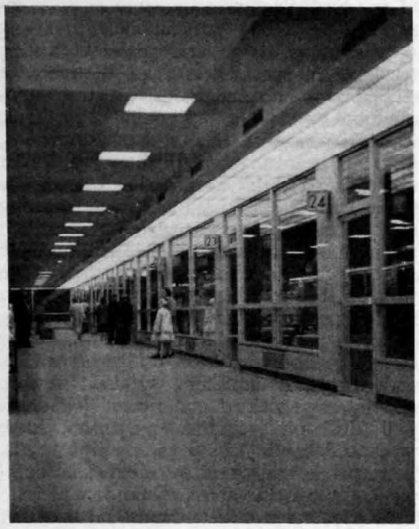

Fig. 11—Departure booths inunderground bus terminal, Chicago

cities (Fig. 11). These terminals usually contain rows of shops, the rentals of which defray a considerable proportion of the cost of operating the terminal.

In suburban or residential areas, especially those that have a shopping centre, off-street parking lots are usually well designed and often most attractive. A good example is the pioneer communal shopping centre and car park in the country club district of Kansas City, Mo. The parking area may cover as much as 80 per cent of the site and as much attention is usually given to the layout of the car park as to the design of the buildings on the site.[5,6] As a result of considerable experience gained from some of these suburban parking lots, it has been found that the parking requirements can be expressed in terms of a parking index. This is the number of car spaces per 1000 square feet of gross floor area in the shopping centre. For a medium-size store or shopping centre (having a gross floor area of, say, 500,000 square feet), it is necessary to provide sufficient space to give a parking index of five to cater for the average maximum weekly demand or a parking index of about fifteen to cater for peak seasonal demand. There is one factor, however, which applies to American suburban parking lots which may not apply in other countries ; except on rare occasions, it has been found that the average American shopper will not walk more than about 400ft from the car to the shopping centre. This has an important bearing on the design of suburban parking lots, and if the required parking space cannot be provided within a range of about 400ft it is usual to provide multi-storey parking in a building near the shopping centre.

Parking on suburban lots is usually free ; the driver parks his own vehicle and locks it if he wishes, and usually there are facilities for loading goods which are purchased in the stores. Parking at 90 deg. is preferred to diagonal (60 deg.) parking on shopping centre parking lots.[6]

Many American cities are situated on the banks of a river and increasing use is now being made of the waterfront to provide car parks (Fig. 9). Notable examples may be seen in Chicago and Pittsburgh, where many thousands of cars are now parked in this way. In Pittsburgh, a main thoroughfare formerly ran along the waterfront but an overpass has been constructed so that traffic now passes above the original roadway, leaving a stretch of nearly a mile of road for parking ; access is provided by several ramps (Fig. 10).

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(To be continued)

Changing Nature of the Fatigue Problem

By Dr. H. J. GOUGH, F.R.S.

At the International Conference on the Fatigue of Metals sponsored by the Institution of Mechanical Engineers with the co-operation of the American Society of Mechanical Engineers, the following introductory address was presented by Dr. H. J. Gough last Monday morning. He reviews the state of knowledge in 1939 *and the general picture presented by conferences on fatigue held at Melbourne in* 1946 *and the Massachusetts Institute of Technology in* 1950.[1–4]

AS I see it, one principal object of a great conference such as this is to focus recent and current research investigation and progress in knowledge and, by discussion, arrive at balanced interpretation and evaluation. Equally important is to obtain from the engineering industries an indication of their present and probable future problems, for such indications have so often in the past afforded valuable guidance to research and inspired work which made signal contributions to technical development. For, apart from the rich and fascinating fields of investigation into basic aspects of the metallic state which it offers, the study of metal fatigue originally arose from engineering failures in service and has extended and developed side by side with engineering development, with considerable benefit to design and operation. So we might rightly expect to find a changing emphasis and pattern. In that pattern there will naturally persist, for long periods, certain threads representing problems of an abstruse or necessarily long range character, including the continuing quest for a clearer understanding of the basic mechanisms of deformation and fracture. But the main pattern will change, sometimes in a surprisingly sudden and decisive manner.

In the period between the two world wars, covering a most intense activity in this subject, a broad pattern of approach, knowledge and thought seemed to have been established. It was primarily determined, of course, by the fast and far-reaching developments of machinery in general and, particularly, in prime movers for use on land, at sea and in the air. But other patterns emerged subsequently. It may be that, when this week's papers and discussion have been critically examined in a balanced review, another change in pattern will be visible, containing emphasised threads which, formerly, were hardly discernible : possibly with new ones of sufficient intensity as to colour the whole effect.

Reflecting in this way, the thought occurred that, for this occasion, one might briefly examine the changing nature of the fatigue problem. This could have been done by a survey of major investigations, but I felt that, as a preliminary to the demands of the technical sessions, you would not wish to be blinded by slides and tables of data. Also I felt that if the pattern has in fact changed, these changes should emerge naturally, unbiased by personal selection. So I shall attempt, after presenting a sketch of the subject as obtaining in 1939 to act as a first background, to focus the general pictures presented at conferences on fatigue held in 1946 and in 1950.

The General Position at 1939

Had an international conference on fatigue been held in 1939—and one was planned—the papers* presented would have included extensive reviews covering the whole field of research. For the period from 1919 onwards was marked by an unprecedented and intense attack and general exploration of most of the problems which then appeared to be of theoretical and practical importance. A brief review is presented.

Apparently in the belief that design was based entirely on a definite fatigue limit or a lengthy endurance limit, little regard was paid to the shape of an S/N curve, although these were usually carefully determined, tests on a basis of even up to a thousand million cycles being not uncommon. Also, practically no attention was paid to the study of variable loadings involving stresses exceeding the fatigue limit. A few experiments only had been made to determine a "damage line," representing the locus of the maximum

* I have, in fact, drawn largely on a series[5] of lectures delivered at a Conference held in the U.S.A., supplemented where necessary from major publications issued in 1937/39.