Scientific and Technical Workers in the United States Civil Service.

By MAJOR A. G. CHURCH.

THE work of our Civil Service National Council in producing a scheme for reconstruction dealing with the clerical and manipulative workers in British Government Departments has its counterpart in that of a Congressional Joint Commission appointed by the United States Senate to investigate the remuneration and conditions of employment and the need for reform in the Civil Service of the Republic. The Joint Commission commenced its inquiry in March, 1919, and completed its report on reclassification and readjustment of compensation in March last. The report has now been published, and provides an interesting and illuminating commentary on the conditions which prevailed in the American Service before the war, the bewildering and chaotic multiplication of class within class, the gross anomalies in salaries, the absence of any just and sane retirement scheme, and the accentuation of this unsatisfactory state of affairs by war conditions. In this respect Washington appears to have suffered far more than London by the introduction of the "business man" element into its administrative service.

The findings of the United States Commission are particularly interesting in those sections devoted to the scientific, technical, and professional classes—classes, incidentally, which are not yet being considered as a whole by our own National Council. While recognising that the Government Service possesses distinct advantages for these classes, it considers that the advantages are offset to some extent by certain personal restrictions generally unknown in the academic and business world. It finds that "there is serious discontent, accompanied by an excessive turnover and loss, among its best-trained and most efficient employees," and that "the National Service has become unattractive to a desirable type of technical employee." It emphasises the melancholy fact that the advance in the rate of turnover among the scientific technical employees has been three times as fast as the advance for clerical employees; for the former class the average advance in salary on leaving the Government Service was 53 per cent. The resignation curve at the Patent Office is still going up so rapidly that this Department has almost ceased functioning.

To remedy this alarming state of affairs the Commission urges that every effort should be made to stimulate initiative and originality on the part of scientific and other professional workers. "It is peculiarly appropriate that the Federal Government should take the lead in research work of all kinds, but it cannot do so unless it is able to attract and retain independent thinkers of the highest type. The reduction of red tape to a minimum, the encouragement of freedom of thought and action to a maximum, and the direction of research by thoroughly trained investigators would all assist to make this possible." This passage might with equal justice and appositeness have been written as a commentary on the position of scientific workers in our own Government Departments.

For scientific and technical staffs under the reclassification scheme the following titles of classes have been adopted:—Junior, Assistant, Associate, Full Rank (indicated by the absence of any adjective), and Senior. The following table gives the salaries recommended for the various grades in dollars and £ sterling (calculated on an exchange value of £1 = 3·5 dollars). The rates of pay for skilled mechanics and unskilled labourers in the service of the State are also given for purposes of comparison:

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	Minimum	Increment	Maximum
Junior	$1800	$120	$2160
	£515	£34	£617
Assistant	$2400	$120	$3000
	£687	£34	£857
Associate	$3240	$120	$3840
	£926	£34	£1096
Full Rank (physicist, chemist, civil engineer, etc.) ...	$4140	$180	$5040
	£1185	£52	£1445
Senior	No fixed scale		

Skilled mechanic ...	$2100
	£600
Unskilled labourer ...	$1140
	£326

In addition to the above, it is recommended that the cost-of-living factor should be taken into account in determining salary scales.

For the senior-class administrative, scientific, technical, and other professional workers no fixed scales of salary are recommended. It is considered that "the incumbents of these one man or woman positions are the real leaders of the Civil Service of the Republic," and rigid salary scales might prevent their entrance or retention in the Service. The scales quoted apply to all scientific and technical workers employed by the State except medical officers, whose initial salaries are lower and increments larger, but whose final salaries are also lower than those quoted above. The qualification for appointment as a junior scientific or technical worker is apparently the same as that laid down for similar appointments under the Government of this country.

It is laid down as a principle that there should be no discrimination on account of sex; men and women should receive equal pay for equal work, and the door of promotion should be opened impartially to members of both sexes.

Among other noteworthy recommendations by this Commission are the following:

(1) The appointment of an Advisory Council of twelve members to the Civil Service Commission: six to be nominated by the President of the United States and six to be elected by the employees.

(2) The adoption of an efficiency rating system to govern promotions, demotions, and increments.

(3) Interdepartmental promotions.

(4) Upon appointment to a position in a particular class an employee should be paid at the minimum rate prescribed for such class.

(5) Annual leave to be uniform throughout all classes of employees, viz. 2½ days per month.

(6) Investigation as to the possibility of the adaptation of psychological tests to the selection of candidates for the Civil Service.

It is improbable that the last two recommendations would be likely to find much favour in the eyes of the British authorities. As for an efficiency rating system, it is easy to predict the difficulty that will be experienced in adapting any such scheme to scientific workers; in its report the Joint Commission recognises this fact.

In a detailed criticism of the Reclassification Report

Dr. Edward B. Rosa, of the U.S. Bureau of Standards, lays stress on the departure from established custom which is entailed by the fourth recommendation. He considers that such a system will make the State Service the refuge of the mediocrity, since there is no incentive to the individual worker. He would wish to see initial salaries determined by the promise of the candidate for a class.

The most serious objection which can be raised to the report is the almost complete failure of the Joint Commission to suggest a remedy for a disease which is only too prevalent in the United States Service: the lack of co-ordination and co-operation in research. Before the war each Department was watertight, the idea being to prevent the overlapping of research—which many consider vital to its prosecution—and consequent waste. It is not clear that any particular attention has been paid to this aspect of departmental practice. Above all, it is not evident that the Commission has fully appreciated the possibilities of the co-ordination of research and other scientific Departments of the State.

Efficiency in Industry.

WE referred last week to the comprehensive exhibition at Olympia organised under the auspices of the *Daily Mail* with the object of encouraging modern methods of increasing efficiency by the application of scientific principles. The range covered is large, dealing as it does with education, commercial organisation, factory equipment, and general industrial matters, but the keynote of applying scientific rather than haphazard methods to obtain the improved results now so badly needed runs through it all.

Scientific education is represented on the stand of the University of London, where, among other things, is to be found an interesting display exemplifying the development of the thermionic valve, which is the basis of most modern wireless telegraph work. This goes back to lamps fitted with internal plates by Prof. J. A. Fleming in 1887–89 for the study of the unidirectional conductivity effect discovered by Edison in 1883. Some of the original oscillation valves made as a result of these researches in 1904, and practically used in wireless telegraphy, are also shown. The later developments of the three-electrode valve are exemplified by a large number of valves of different design, including the form to which de Forest gave the name of the "audion." A recent four-electrode valve of Prof. Fleming's own design is to be seen, and the very latest development in wireless telegraphy is exemplified by a large transmitting valve made by the Marconi-Osram Valve Co. Some historic apparatus used by Sir William Ramsay in his researches upon the rare gases is also shown, and a collection of historic electrical apparatus from the laboratories of King's College includes some used by Clerk Maxwell.

Sheffield University shows exhibits relating to the production of cupro-nickel and some special apparatus developed by the department of glass technology. Armstrong College, Newcastle, shows Dr. Bedson's apparatus for the investigation of coal-dust explosions and the inhibitory power of inert dusts. A small amount of the dust mixture to be tested is blown by a puff of air on to a heated platinum wire in a glass bulb, and the sudden rise of pressure due to the little explosion is noted. Another educational exhibit is that of Loughborough College, Leicestershire, which is largely devoted to the work of students of the college. The technical training of partly disabled men occupies a deservedly large section of the exhibition, where the men are seen working at their various trades. An interesting exhibit relating to industrial efficiency is that of Major F. B. Gilbreth, consisting of a working laboratory for the recording of the actual movements of operatives in performing any given operation with the view of determining the most economical and least fatiguing way in which it can be carried out.

Among exhibits in the general engineering section it is interesting to see the Constantinesco wave system of power transmission working rock drills and other appliances on the stand of Messrs. W. H. Dorman and Co., Ltd. Attention should also be directed to an instrument for the regulation of temperature shown by British Oil and Fuel Conservation, Ltd. This is known as the Freeman precision control, and depends on the change of volume of the air in a bulb placed within the furnace or other chamber being heated. The expansion and contraction of the air drive a little column of mercury up and down an inclined tube, causing it to open or close a contact which, by means of a relay arrangement, controls the valve or other device regulating the supply of the heating medium.

Various branches of electrical engineering are represented in the comprehensive exhibit of the British Thomson-Houston Co., Ltd., including an electric welding plant in operation. Particular attention may be directed to a portable Röntgen-ray outfit employing the Coolidge tube with heated cathode. This is arranged to make up into four easily carried packages, and can be erected at the bedside of a patient. It is worked by means of a small transformer, with or without a rotary converter, from any ordinary direct- or alternating-current supply circuit. The power required is about 600 watts. Another remarkable piece of portable apparatus is a wireless receiving set, weighing no more than 20 lb. and needing no external connections, which will pick up messages from the chief Continental stations. A rectifier for charging small batteries from alternating-current circuits, acting on the same principle as the thermionic valve, is also shown.

A representative display of wireless telegraph apparatus is made by the Marconi Wireless Telegraph Co. A complete 3-kw. valve transmitting station for land use is shown, as well as several smaller sizes of valve receiving and transmitting equipments down to a 20-watt portable apparatus, Demonstrations are given by means of the "radio-megaphone," which is a combination of a wireless telephone receiving apparatus and a Creed "stentorphone." This latter in its ordinary form is a loud-speaking gramophone in which the record actuates a valve controlling a flow of compressed air, and gives purer and more powerful sounds than the ordinary gramophone. A large example used in this way is placed in the gallery, where it discourses music, etc., which can be heard all over the building. In the "radio-megaphone," however, the gramophone needle is replaced by a piece of specially designed apparatus which enables the wireless telephone receiver to actuate the control valve. One of these combination instruments on the Marconi stand is used to make audible the time-signals received from the Eiffel Tower and from Nauen, and to reproduce music and speech from a small wireless station at Surbiton. These are picked up on an aerial just outside Olympia.

Messages are also sent periodically from Surbiton in the Morse code at a high speed and are printed in