

sequence of the desire to earn the same weekly wage as before the hours were shortened. (b) Owing to the reduction of the working time first by a change from a twelve-hour day to a ten-hour day, and subsequently by the abolition of Sunday labor, it was possible to compare output under three conditions. The group of women (numbering from eighty to one hundred) engaged in the moderately heavy labor of turning aluminum fuse bodies provided the following comparative results: (1) When actually working 66 hours a week and nominally 74.8 hours, their relative hourly production was 100 and their relative gross production 100. (2) When actually working 54.8 hours and nominally working from 58.5 to 66 hours, their hourly production was 134 and their gross production 111. (3) When actually working 45.6 hours and nominally working from 49.5 to 58.5 hours, their hourly production was 158 and their gross production 109. It is to be inferred, therefore, that had these women been working, uniformly, a nominal 50-hour week their gross output would have been as large as when they were working a nominal 66-hour week, and considerably greater than when they were working a 77-hour week. (c) A group of forty women engaged in the light labor of milling a screw thread on the fuse bodies improved their gross output by 2 per cent. when actually working 54.8 hours a week, the standard being their gross output when working 64.9 hours per week. A further reduction of actual working hours to 48.1 resulted in such an improvement of hourly output that the gross output was 1 per cent. less than when the actual working time was 16.8 hours more. (d) A group of fifty-six men engaged in the heavy labor of sizing the fuse bodies improved their hourly output by 37 per cent. and their gross output by 21 per cent. when actually working 51.2 hours, the standards being the hourly and gross outputs observed when the actual weekly hours were 58.2. (e) Fifteen youths engaged in the light labor of boring top caps by means of automatic machines produced only 3 per cent. less output when their actual weekly hours of work were 54.5 hours than when they were 72.5 hours.

(f) A part of the improvement in output was due to the workers starting work more promptly when on shorter hours. At one period the women engaged in turning fuse bodies lost on the average thirty-seven minutes daily by starting work after, and stopping before, the nominal time. Nine months later, when their hourly output was 25 per cent. better, they lost only twenty-six and one half minutes daily in these ways. (g) A rest from work on Sunday is followed by a relatively low output on Monday, and this output steadily rises in the course of the week, owing to the increased efficiency produced by practise. Generally, the cumulative effects of fatigue neutralize and overpower this increased efficiency, and the output may fall after the second day (or night) of the working week if the hours are long and the work laborious, or not till after the third, fourth or even fifth day, if the hours are shorter. In the absence of a Sunday rest, the fatigued worker has no opportunity for complete recuperation and his output, though more uniform, remains permanently at a lower level than that shown on Monday by a worker who has rested on Sunday.

#### ELECTRICAL ENGINEERS AS LIEUTENANTS IN THE U. S. NAVAL RESERVE

1. THE Secretary of the Navy has authorized the commissioning of one hundred graduate electrical engineers as lieutenants, junior grade, in the Naval Reserve, and directed that the necessary action be taken to provide these officers at the earliest practicable date.

2. The qualifications for such officers to be in general as follows: (a) Citizens of the United States. (b) College graduates in electrical engineering. (c) Not less than three years' employment in electrical work since graduation. (d) Between twenty-five and thirty-five years of age. (e) Of character and physique required for officers of the regular service.

3. Pay and allowances of lieutenants, junior grade, are the same as in the regular Navy, and are, approximately: \$2,200 at sea; on shore, including allowances for commutation of quarters, heat and light, \$2,480. There is an

additional allowance of \$150 for uniforms in time of war.

4. Eighty-five nominations of electrical engineers meeting the above requirements to be made by each of the following agencies:

(a) Naval Consulting Board.

(b) National Research Council.

(c) American Institute of Electrical Engineers.

5. Upon receipt of the 255 nominations thus made certain forms will be sent each nominee to execute, and upon receipt of the executed forms a Board of Naval Officers will select 100 for appointment.

6. After appointments have been made the officers so nominated and selected will be given a month's training and instructions on shore in naval methods, customs and regulations and instructions. Pay will begin on date of appointment.

7. Upon completion of the month's training on shore they will be ordered to the active fleet as electrical officers of ships for a period of at least six months. After this period they will be assigned to duty as the exigencies of the service may demand, excepting such as may be unfitted for the naval service.

8. The utmost care will be exercised in the nomination of these candidates as regards professional ability, physical condition, temperament and bearing, to the end that each one may qualify and not be subjected to inconvenience and disappointment and that the Navy may be benefited accordingly.

9. The Provost Marshal General of the U. S. Army has stated that any one subject to the Selective Draft Law may be released from compliance in order to accept an appointment as officer in the U. S. Naval Reserve Force.

10. Any one who now is in the Army, either volunteer or drafted, may make application but must obtain his discharge before he can be appointed. This includes any one who has been directed to appear before an exemption board. Those now in the Naval Reserve are eligible.

11. Individual nominations will be received, but any one making such should first assure himself that his nominee will agree to serve if

selected and give as much information as possible to assist the committees in making nominations to the Department.

12. Any member of the electrical profession who can meet the technical requirements and who can submit proper credentials may make direct application to the undersigned.

13. To facilitate the work of selection, applicants should submit, in time to reach the committees not later than *October 15*, the following detailed information on the attached blank.

14. Letters from at least three responsible personal acquaintances should accompany each application.

15. From the nominations received the undersigned will each select 85 names to be forwarded to the Bureau of Navigation, Navy Department, Washington, D. C., from which total 100 names will be finally selected for commissions.

Applications may be sent to any one of the undersigned:

NAVAL CONSULTING BOARD OF THE U. S.,

13 Park Row, New York,

NATIONAL RESEARCH COUNCIL,

33 West 39th Street, New York,

AMERICAN INSTITUTE OF ELECTRICAL

ENGINEERS,

33 West 39th Street, New York.

NEW YORK,

October 3, 1917

#### THE PSYCHOLOGICAL EXAMINATION OF RECRUITS

As was announced in *SCIENCE* at the time, a committee on psychology has been organized, with the approval of the council of the American Psychological Association, by the National Research Council. This committee consists of J. McKeen Cattell, G. Stanley Hall and E. L. Thorndike, from the National Academy of Sciences; Raymond Dodge, S. I. Franz and G. M. Whipple, from the American Psychological Association, and C. E. Seashore, J. B. Watson and R. M. Yerkes, from the American Association for the Advancement of Science. Dr. Yerkes, this year president of the American Psychological Association, lately professor of comparative psychology at