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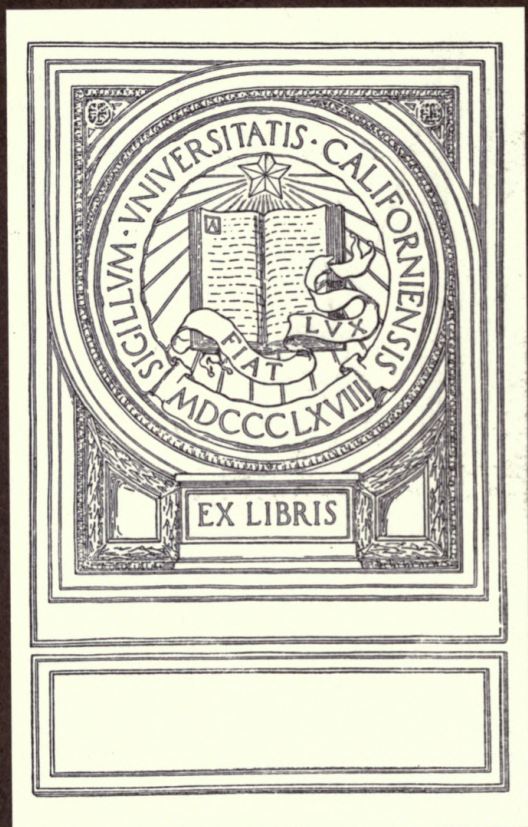
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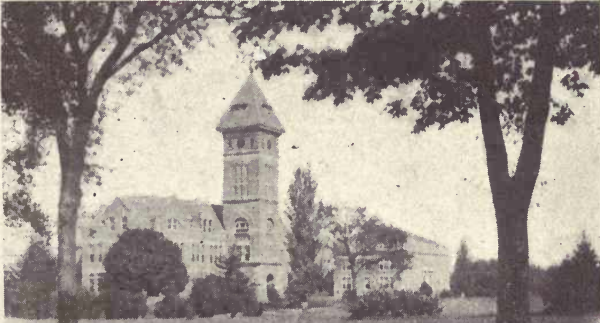
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PUBLICATIONS OF THE ENGINEERING DEPARTMENTS

VOL. V

AUGUST, 1921

NO. 3



## ENGINEERING LECTURES

CIRCULAR NO. 3

The Engineering Extension Service  
of  
Purdue University

UNIVERSITY OF CALIFORNIA



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CIRCULAR NO. 3

ENGINEERING EXPERIMENT STATION

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ENGINEERING LECTURES

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The Engineering Extension Service  
*of*  
Purdue University

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PURDUE UNIVERSITY  
LAFAYETTE, INDIANA  
AUGUST, 1921



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THE ENGINEERING EXTENSION SERVICE  
of  
PURDUE UNIVERSITY

Purdue University recognizes its opportunity for public service by carrying the benefits of its teaching and research activities to those in the State who are interested in engineering problems but who are unable to be benefited by the regular courses of resident instruction which are offered at the University.

For several years short courses have been carried on by Purdue University for the benefit of road superintendents and electrical repair men. During the year 1920-1921, courses have been conducted by the engineering staff of Purdue in several of the cities of Indiana for the benefit of factory executives and power plant operators.

Purdue University is now offering to extend its engineering public service activities for the benefit of manufacturers, engineers and civic organizations. Lectures and conferences dealing with a variety of engineering problems will be conducted in different parts of the State by the best trained and most experienced of the engineering professors of Purdue University.

A complete list of the engineering lectures offered by Purdue University is given in this bulletin. These lectures will be delivered free of charge to any community in Indiana, but Purdue University expects to be reimbursed for the actual traveling and hotel expenses of the lecturer.

In order that this service may not unduly interfere with the teaching duties of the professors, each engineering lecture will be delivered to not more than three communities during any one year. The lectures can best be scheduled during the period from September 15th to May 15th.

Arrangements concerning these engineering lectures may be made by addressing the Dean of Engineering at Purdue University, LaFayette, Indiana.

# ENGINEERING LECTURES

The Engineering Extension Service  
of  
Purdue University

## GROUP I. GENERAL ENGINEERING LECTURES (Suitable for Engineering Clubs, Manufacturers' Associations and Civic Organizations)

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|---|--|
| 1. BUILDING RESIDENCES FOR COMFORT AND FUEL ECONOMY | J. D. Hoffman, Professor of Practical Mechanics                  |
| 2. PUBLIC HEALTH AND SANITATION                     | R. B. Wiley, Professor of Sanitary Engineering                   |
| 3. CITY PLANNING                                    | G. E. Lommel, Associate Professor of Civil Engineering           |
| 4. THE PANAMA CANAL                                 | W. K. Hatt, Professor of Civil Engineering                       |
| 5. POWER  | A. A. Potter, Dean of Engineering                                |
| 6. THE GREATEST BRIDGES IN THE WORLD                | Albert Smith, Professor of Structural Engineering                |
| 7. ENGINEERING MONUMENTS                            | W. A. Knapp, Associate Professor of Civil Engineering            |
| 8. ELECTRICAL CONVENIENCES FOR THE HOME             | D. L. Curtner, Assistant Professor of Electrical Engineering     |
| 9. DOMESTIC HEATING                                 | R. W. Noland, Assistant Professor of Heating and Ventilation     |
| 10. TELEPHONE SERVICE                               | R. V. Achatz, Assistant Professor of Electrical Engineering      |
| 11. ARTIFICIAL GAS                                  | H. C. Peffer, Professor of Chemical Engineering                  |
| 12. RATES FOR LIGHT AND POWER                       | C. F. Harding, Professor of Electrical Engineering               |
| 13. THE STEAM AUTOMOBILE                            | A. C. Staley, Associate Professor of Gas Engineering             |
| 14. AIRCRAFT; PAST, PRESENT AND FUTURE              | M. L. Thornburg, Instructor in Gas Engineering                   |
| 15. REFRIGERATION PRACTICE                          | A. W. Cole, Professor of Steam Engineering                       |
| 16. WATER POWER                                     | F. W. Greve, Associate Professor of Hydraulic Engineering        |
| 17. SYSTEMS OF HIGHWAYS                             | C. C. Albright, Associate Professor of Railway Civil Engineering |
| 18. MECHANISM OF COMBUSTION                         | G. A. Young, Professor of Mechanical Engineering                 |
| 19. THE MANUFACTURE OF NITRIC ACID FROM THE AIR     | C. F. Harding, Professor of Electrical Engineering               |



## GROUP II. PROBLEMS OF THE FACTORY EXECUTIVE

(Lectures Suitable for Factory Owners, Superintendents  
and Foremen)

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|---|--|
| 1. FACTORY ORGANIZATION                               | G. H. Shepard, Professor of Industrial Engineering           |
| 2. PRINCIPLES OF MANAGEMENT                           | G. H. Shepard, Professor of Industrial Engineering           |
| 3. ACCURATE STANDARDS OF MEASUREMENTS                 | W. P. Turner, Professor of Practical Mechanics               |
| 4. GRINDING PROCESSES AS APPLIED TO MODERN PRODUCTION | W. P. Turner, Professor of Practical Mechanics               |
| 5, 6. RECORDS, PLANNING AND DISPATCHING               | G. H. Shepard, Professor of Industrial Engineering           |
| 7. SOURCE OF POWER FOR THE FACTORY                    | G. A. Young, Professor of Mechanical Engineering             |
| 8. ELECTRIC MOTORS AND THEIR CONTROL                  | L. D. Rowell, Associate Professor of Electrical Engineering  |
| 9. TRANSMISSION OF POWER                              | G. C. King, Associate Professor of Mechanical Drawing        |
| 10. BELT TRANSMISSION                                 | L. V. Ludy, Professor of Experimental Engineering            |
| 11. LUBRICATION OF MACHINERY                          | A. W. Cole, Professor of Steam Engineering                   |
| 12. ECONOMICS OF INDUSTRIAL LIGHTING                  | A. N. Topping, Professor of Electrical Engineering           |
| 13. FACTORY HEATING PROBLEMS                          | R. W. Noland, Assistant Professor of Heating and Ventilation |
| 14. FACTORY BUILDING DESIGN                           | H. J. Kesner, Associate Professor of Structural Engineering  |
| 15. THE MANUFACTURE OF PIG IRON                       | J. D. Hoffman, Professor of Practical Mechanics              |
| 16. THE MANUFACTURE OF WROUGHT IRON AND STEEL         | J. D. Hoffman, Professor of Practical Mechanics              |
| 17. FACTORY COST KEEPING                              | G. H. Shepard, Professor of Industrial Engineering           |
| 18. EMPLOYMENT PROBLEMS                               | G. H. Shepard, Professor of Industrial Engineering           |



### GROUP III. STEAM AND ELECTRIC RAILWAY PRACTICE

(Lectures Suitable for Railway Engineers, Master Mechanics,  
Managers and Engineers of Electric Railways)

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|--|---|
| 1. THE DEVELOPMENT OF THE STEAM<br>LOCOMOTIVE                      | H. Rubenkoenig, Associate Professor<br>of Railway Mechanical Engineer-<br>ing |
| 2. STEAM LOCOMOTIVE ECONOMY  | H. Rubenkoenig, Associate Professor<br>of Railway Mechanical Engineer-<br>ing |
| 3. STEAM LOCOMOTIVE VALVE GEARS                                    | H. Rubenkoenig, Associate Professor<br>of Railway Mechanical Engineer-<br>ing |
| 4. FIRE HAZARDS OF LOCOMOTIVE<br>SPARKS                            | G. A. Young, Professor of<br>Mechanical Engineering                           |
| 5. CONTROL OF PUBLIC UTILITIES BY<br>PUBLIC SERVICE COMMISSIONS    | C. F. Harding, Professor of<br>Electrical Engineering                         |
| 6. THE ECONOMICAL USE OF ELECTRIC-<br>ITY ON ELECTRIC RAILWAY CARS | D. D. Ewing, Professor of<br>Railway Electrical Engineering                   |
| 7. THE ELECTRIC VS. THE STEAM<br>LOCOMOTIVE                        | D. D. Ewing, Professor of<br>Railway Electrical Engineering                   |
| 8. STREET RAILWAY PROBLEMS   | D. D. Ewing, Professor of<br>Railway Electrical Engineering                   |

### GROUP IV. POWER PLANTS

(Lectures for Power Plant Engineers and Operators)

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|---|--|
| 1. POWER  | A. A. Potter, Dean of Engineering                              |
| 2. MECHANISM OF COMBUSTION                                  | G. A. Young, Professor of<br>Mechanical Engineering            |
| 3. BOILER ROOM CHEMISTRY                                    | H. C. Peffer, Professor of<br>Chemical Engineering             |
| 4. POWDERED AND CRUSHED COAL                                | G. A. Young, Professor of<br>Mechanical Engineering            |
| 5. SMOKE PREVENTION   | A. W. Cole, Professor of<br>Steam Engineering                  |
| 6. STEAM  | A. W. Cole, Professor of<br>Steam Engineering                  |
| 7. BOILER ROOM ECONOMY                                      | A. A. Potter, Dean of Engineering                              |
| 8. ENGINE ROOM ECONOMY                                      | L. V. Ludy, Professor of<br>Experimental Engineering           |
| 9. FACTORS TO BE CONSIDERED IN<br>DETERMINING COST OF POWER | G. C. King, Associate Professor of<br>Mechanical Engineering   |
| 10. ELEMENTS OF ELECTRICAL<br>ENGINEERING                   | C. F. Harding, Professor of<br>Electrical Engineering          |
| 11. ELECTRIC CIRCUITS AND CONNECTION<br>DIAGRAMS            | L. D. Rowell, Associate Professor<br>of Electrical Engineering |
| 12. TRANSFORMERS  | J. B. Bailey, Instructor in<br>Electrical Engineering          |

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| 13. SWITCHBOARDS   | D. D. Ewing, Professor of<br>Railway Electrical Engineering   |
| 14. ELECTRIC METERS                                      | D. D. Ewing, Professor of<br>Railway Electrical Engineering   |
| 15. TESTS OF POWER PLANT<br>EQUIPMENT                    | L. V. Ludy, Professor of<br>Experimental Engineering          |
| 16. THE INDICATOR CARD                                   | G. W. Munro, Associate Professor<br>of Mechanical Engineering |
| 17. THE INTERNAL COMBUSTION ENGINE                       | A. C. Staley, Associate Professor<br>of Gas Engineering       |
| 18. RELATION OF POWER FACTOR AND<br>LOAD FACTOR TO RATES | C. F. Harding, Professor of<br>Electrical Engineering         |

### GROUP V. ELECTRICAL PROBLEMS

(Lectures of Interest to Electricians, Meter Men and  
Telephone Workers)

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|--|--|
| 1. ELEMENTS OF ELECTRICITY               | C. F. Harding, Professor of<br>Electrical Engineering  |
| 2. ELECTRIC CIRCUITS                     | G. C. Blalock, Assistant Professor<br>of Electrical Engineering  |
| 3. STORAGE BATTERIES                     | D. L. Curtner, or G. C. Blalock,<br>Assistant Professor of Electrical<br>Engineering   |
| 4. TRACING THE KILOWATT                  | J. B. Bailey, Instructor in<br>Electrical Engineering  |
| 5. ELECTRIC METERS                       | D. D. Ewing, Professor of Railway<br>Electrical Engineering, or D. L.<br>Curtner, Assistant Professor of<br>Electrical Engineering |
| 6. ECONOMICS OF INDUSTRIAL LIGHTING      | A. N. Topping, Professor of<br>Electrical Engineering  |
| 7. TELEPHONE SERVICE                     | R. V. Achatz, Associate Professor<br>of Telephone Engineering  |
| 8. ELECTRICAL APPLICATIONS               | L. D. Rowell, Associate Professor<br>of Electrical Engineering   |
| 9. SWITCHBOARDS                          | D. D. Ewing, Professor of<br>Railway Electrical Engineering  |
| 10. ELECTRIC MOTORS AND THEIR<br>CONTROL | L. D. Rowell, Associate Professor<br>of Electrical Engineering   |

### GROUP VI. THEORETICAL ENGINEERING

(Lectures Suitable for Technically Trained Engineers)

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|-----------------------------------|---|
| 1. FOUNDERS OF MECHANICS          | R. G. Dukes, Professor of<br>Applied Mechanics                |
| 2. THE KINETIC THEORY OF HEAT     | G. W. Munro, Associate Professor<br>of Mechanical Engineering |
| 3. APPLICATIONS OF THERMODYNAMICS | A. A. Potter, Dean of Engineering                             |
| 4. APPLICATIONS OF ENTROPY        | G. W. Munro, Associate Professor<br>of Mechanical Engineering |



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| 5. LIMITATIONS OF HEAT ENGINE EFFICIENCIES       | G. W. Munro, Associate Professor of Mechanical Engineering            |
| 6. CONCRETE CONSTRUCTION PROBLEMS                | W. K. Hatt, Professor of Civil Engineering                            |
| 7. RELATION OF POWER FACTOR TO RATES             | C. F. Harding, Professor of Electrical Engineering                    |
| 8. TURBINE DESIGN                                | L. V. Ludy, Professor of Experimental Engineering                     |
| 9. INDUSTRIAL ENGINEERING                        | G. H. Shepard, Professor of Industrial Engineering                    |
| 10. POWER GAS                                    | G. A. Young, Professor of Mechanical Engineering                      |
| 11. FUELS AND COMBUSTION                         | H. C. Pepper, Professor of Chemical Engineering                       |
| 12. WATER MEASUREMENT                            | F. W. Greve, Associate Professor of Hydraulic Engineering             |
| 13. ACCURATE STANDARDS OF MEASUREMENT            | W. P. Turner, Professor of Practical Mechanics                        |
| 14. THE WIND AT WORK AND PLAY                    | Albert Smith, Professor of Structural Engineering                     |
| 15. INSULATORS FOR HIGH VOLTAGE TRANSMISSION     | C. F. Harding, Professor of Electrical Engineering                    |
| 16. FUNDAMENTAL METHODS IN MECHANICS             | R. G. Dukes, Professor of Applied Mechanics                           |
| 17. BEAMS AND COLUMNS                            | R. G. Dukes, Professor of Applied Mechanics                           |
| 18. GRAPHIC METHODS FOR MECHANICS COMPUTATIONS   | R. G. Dukes, Professor of Applied Mechanics                           |
| 19. THE "FREE-BODY" METHOD IN MECHANICS          | A. P. Poorman, Associate Professor of Applied Mechanics               |
| 20. RAPID METHODS OF COMPUTING STRESSES IN BEAMS | A. P. Poorman, Associate Professor of Applied Mechanics               |
| 21. STRESS DISTRIBUTION IN PLATE GIRDERS         | C. H. Lawrance, Assistant Professor of Applied Mechanics              |
| 22. SHEARING STRESSES IN BEAMS                   | C. H. Lawrance, Assistant Professor of Applied Mechanics              |
| 23. THE ELECTRIC LOCOMOTIVE                      | D. D. Ewing, Professor of Railway Electrical Engineering              |
| 24. STEAM LOCOMOTIVE ECONOMY                     | H. Rubenkoenig, Associate Professor of Railway Mechanical Engineering |
| 25. PROBLEMS IN ELECTRICAL DESIGN                | Alfred Still, Professor of Electrical Design                          |
| 26. LIMES, CEMENT AND MORTAR                     | H. C. Pepper, Professor of Chemical Engineering                       |



RESIDENT INSTRUCTION AND RESEARCH IN  
ENGINEERING

AT

PURDUE UNIVERSITY

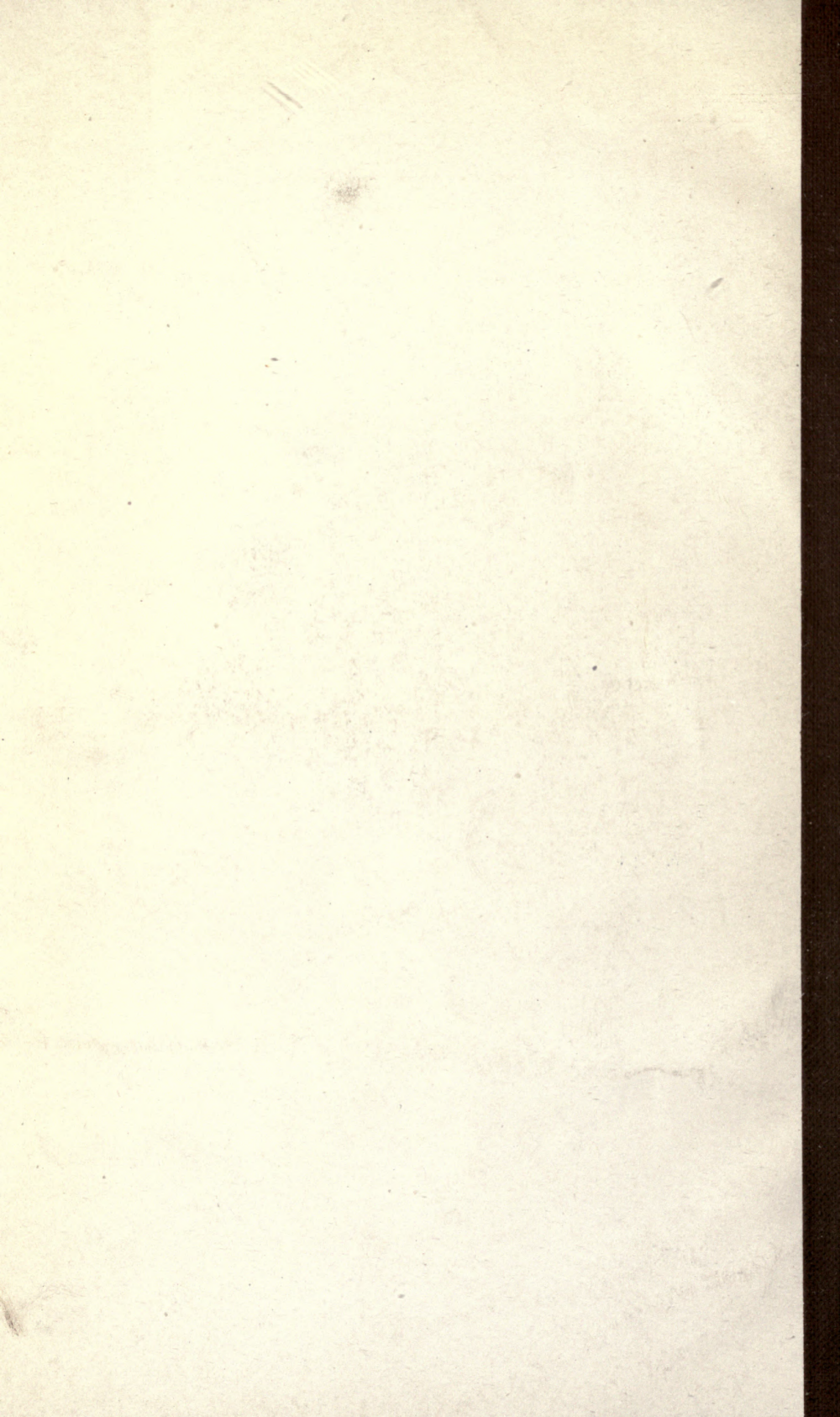
ENGINEERING INSTRUCTION.—The people of Indiana have at Purdue one of the largest, best equipped and most prominent engineering colleges in the country. Four collegiate courses are offered in Civil, Chemical, Electrical and Mechanical Engineering. Extensive laboratories are available for the study of materials of construction, shop practice, electrical machinery and instruments, telephony, radio, steam power, gas power, water power, steam and electric railway equipment, aerodynamics and the sciences underlying engineering practice. Student registration in the engineering courses during the year 1920-1921 exceeded 1,800.

The training in engineering given at Purdue University has a direct bearing upon the prosperity and comfort of the people of the State and of the Nation. Indiana is vitally interested in improved roads, the reclamation of land by drainage, better bridges, viaducts and buildings, more efficient service by public utilities, good water supply and sewage disposal systems for cities and towns, conservation of the State's resources and the development of its manufacturing industries. Purdue University is training engineers who are capable of taking a leading part in the solution of the above as well as of other engineering problems which affect public welfare.

ENGINEERING RESEARCH.—Besides training engineers, the staff and equipment of Purdue University are being utilized to solve problems of value to the industries, utilities and public works of the State. In the Purdue Engineering Experiment Station, researches and experiments are constantly being carried on which are of direct benefit to the State and to the Nation. The Purdue Engineering Experiment Station bears the same relation to the manufacturing industries and to the public utilities of Indiana as does the Purdue Agricultural Experiment Station to the agricultural industry. The Purdue Engineering Experiment Station besides serving the public adds value to the instructional work of the Engineering Departments by bringing the students in contact with practical engineering problems.









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