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BOOKS

**JAMES WATT AND
THE HISTORY OF STEAM POWER**
by Ivor B. Hart

Henry Schuman, N.Y., 250 pp., \$4

*Reviewed by Peter Kyropoulos
Assistant Professor of
Mechanical Engineering*

IVOR B. HART is a familiar name to those who are interested in the history of science and engineering; he has written *The Mechanical Investigations of Leonardo da Vinci*; *The Great Physicist*; *The Great Engineers*, etc. It is not surprising then that the emphasis here is on the history of steam power rather than on James Watt.

The book starts with a review of the development of civilization and points out how the need for mechanical power sources gradually became the key problem of industrialization. It becomes clear that the steam engine is really not an invention but a development to which many people contributed.

Then follows a chapter on "The England and Europe of James Watt," in which the development of science and engineering in the 18th century is traced, in order to furnish the philosophical background for the biography. After a short passage on Watt's early life, some of the principles of physics are reviewed in the sequence of their discovery (nature of air pressure, latent heat of steam). Much of this reminds one of the treatment of Lancelot Hogben in *Science for the Citizen* and is equally well done, if perhaps somewhat tedious to a reader who has never heard of it before.

It is then shown how the problem of removing water from mines furnished a powerful incentive to develop some sort of prime mover to do the pumping job which kept men and horses busy day and night. We hear about Savery and Newcomen and their engines, as well as their predecessors. All these earlier engines employed condensation of steam to produce a vacuum in the cylinder against which the atmosphere then would move the piston.

Watt recognized the limitation which this imposed on the useful pressure ratio. The maximum working pressure was 14.7 psia and no more. Watt's contributions are thermodynamic and mechanical improve-

(1) Addition of a condenser, sep-

arate from the engine cylinder.

(2) Use of pressure steam in the cylinder.

(3) Use of expansion of the steam in the cylinder.

(4) Use of crank and connecting rod to translate reciprocating into rotating motion.

(5) Introduction of the slide valve.

(6) Use of the governor to control the speed of the engine.

With the exception, perhaps, of the slide valve and the pressure volume indicator, none of the items listed were new inventions in the strict sense; only their use and combination was new. It is this combination which constitutes Watt's contribution and which made his engine the prime mover that was needed for the growing industry.

The usual troubles of financing and marketing a development program mark the struggle of Watt and his partners and backers. The book ends with the death of Watt and a brief look at steam power since then.

The author has produced a book which is both readable and correct, which is more than can be said for the usual attempt of biographers, who write without knowledge of the victim's specialty.

APPLIED HYDROLOGY

by Ray K. Linsley, Jr., Max A. Kohler,
and Joseph L. K. Paulhus

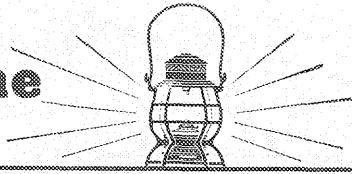
McGraw-Hill, N.Y., 689 pp., \$8.50

*Reviewed by Jack E. McKee
Associate Professor of
Sanitary Engineering*

FOR TWO DECADES or more the standard text and reference books in the relatively unexplored field of hydrology have been Mead's *Hydrology* and Meyer's *Elements of Hydrology*. Since 1945, however, there has been a rash of new books on the general subject of hydrology and on its specialized branches. This is attributable in part to the fact that Mead's and Meyer's books, while now classics, are decidedly out of date; in part to the fact that since the early days of the New Deal there has been a great expansion in applied hydrology as manifested in flood-control works, water supply, pollution abatement, and reclamation projects; and in part to the fact that though the technical jour-

CONTINUED ON PAGE 4

The Main Line



FEBRUARY, 1950



Modesty is a becoming virtue, we know. It isn't decorous to rush about exclaiming, "Hey, look at me!" All you're supposed to do is build a better television set, then man the ramparts while the world beats a path to your door.

Of course, transportation—not television—is our business. And our S.P. travel offices are conveniently located on paved streets—so path-beating is a bit unnecessary.

Nevertheless, in short, casting modesty aside—and stopping this mixing of metaphors and adding of axioms—we were wondering if you've looked us over lately.

New Place to Eat

The Golden State, de luxe pride and joy of our Los Angeles-Chicago service, has just acquired (among other items of glamorous new equipment) some beautiful new dining cars. Outside, they match the rest of the train—so you have to go inside (and have a meal) to appreciate how wonderful a dining room can be—and still be portable.

The picture at the top of the page gives only a vague idea. You'd need a color photo to give you a good idea of the *decor* (fancy word for fixings). The chairs—metal-framed, with soft, foam rubber seats—are among the most comfortable we've ever rested a posterior on. And, of course, the food—prime requisite of a good restaurant—will please any gourmet.

That other equipment we mentioned—additional chair cars (featuring ad-

justable leg rests) and lounges—is of the same eye-pleasing, full-comfort type.

Art Puzzler

Incidentally, while we're talking about the *Golden State* and eye-pleasing stuff: in the aforementioned dining cars and lounges, we've used big photo-murals of beauty spots along the routes as main items of decoration.

These king-sized photos are in color—and therein lies the cause of many an argument and bet. Every trip out—our stewards tell us—they have to settle the matter of whether these are *color* photos (i.e.: kodachrome or some other such process) or *colored* photos (hand painted).

Well, just to settle the matter, let us state officially that these very handsome, very natural-looking photo murals are colored by hand.

New Overland Cars, Too

To give another route its due—the *San Francisco Overland*, fastest no-extra-fare train between the Golden Gate and Chicago, has new dining cars and lounges, too—and the extra-fast, extra-fare *City of San Francisco* (also on the Overland Route) has new diners, lounges AND reclining chair cars.

So, all in all, we honestly think we've something to crow about. And while we have lots more new equipment still coming, we're ready now to give you the best ride you've ever had, practically any place you want to go. Drop around and see us, soon.

Books

CONTINUED FROM PAGE 2

nals have been replete with papers on various phases of hydrology, most of the significant material has just recently begun to be condensed in book form.

Of several excellent new books, *Applied Hydrology* is the most general and the most complete. While not exhaustive in its treatment—no standard-sized volume could hope to be—it is a thorough presentation of all of the normal phases of hydrology and even delves into related phenomena such as sedimentation, silting, bedload movement, and wave action. That the chapters on climatology, atmospheric temperatures, humidity, and winds are especially thorough is not surprising in view of the fact that all three authors are employees of the Weather Bureau.

This book was intended to be a convenient text reference for general data, basic theory, and methods of application. In their first and third purposes the authors have succeeded admirably, including a wealth of data, empirical formulae, references to recent literature, and descriptions of current practice. Their so-called "basic theory," however, is often far from basic. In presenting the detailed results of many empirical formulations the authors have frequently by-passed elementary concepts and mathematical development. If it is used as a student textbook, *Applied Hydrology* should be supplemented by more fundamental treatment of the probability analysis and other mathematical tools.

Geographically, this book overcomes the tendency of older texts to rely on the longer hydrologic records of the eastern states by including frequent references to western conditions and practice. In this respect it should be welcomed by reclamationists and other engineers west of the 100th Meridian. The chapter on snow, ice, and frost is especially thorough and the presentation of flood routing and unit hydrograph analysis is excellent. The coverage of ground water, however, is weak, comprising less than five percent of the pages in the book, but the authors acknowledge this deficiency and refer the reader to other texts specializing in this phase of hydrology.

Applied Hydrology will be a worthwhile addition to the library of every practicing civil engineer and will make an excellent textbook for a graduate course in advanced hydrology when properly augmented with mathematical analyses and more detail on ground water.

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