A TREATISE ON HYDROSTATICS, VOL. I

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GEORGE M. MINCHIN

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A TREATISE ON
HYDROSTATICS

VOL. I

CONTAINING THE MORE ELEMENTARY
PART OF THE SUBJECT

BY

GEORGE M. MINCHIN, M.A., F.R.S.

LATE PROFESSOR OF APPLIED MATHEMATICS
IN THE ROYAL INDIAN ENGINEERING COLLEGE, COOPER'S HILL

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PREFACE TO VOL. I

THE present edition of this work is divided into two volumes, the first of which covers the course of hydrostatics required of students who compete for scholarships at the Universities. The book has been, in great part, re-written, and the examples have been very largely increased in number.

Very much of this subject of hydrostatics is easily and profitably treated without the use of the differential and integral calculus—not that the calculus is evaded by artifices more difficult than the principles of the calculus itself. For example, nearly all the practically useful work relating to centres of pressure, and much of that relating to floating bodies, is more easily treated by simple geometry and algebra than by the calculus.

Hence the first volume contains very little of the differential and integral calculus. The fundamental principles of certain forms of turbine have been introduced, as they involve no mathematical difficulties and are of great practical importance.

In the revision of proof-sheets I have had the benefit of the advice of so able and competent a mathematical physicist as Mr. Pidduck of Queen's College.

GEORGE M. MINCHIN.

OXFORD,
September, 1912.

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CHAPTER I

NATURE OF FLUID PRESSURE

1. Experimental Illustration of Pressure. Let a vessel of any shape be fitted with a number of weightless pistons of different areas moving in cylindrical tubes without any friction, and let this vessel be filled with a liquid—suppose water or mercury. We shall suppose also that the piston fittings are perfectly liquid-tight, so that no liquid can escape through the piston tubes.

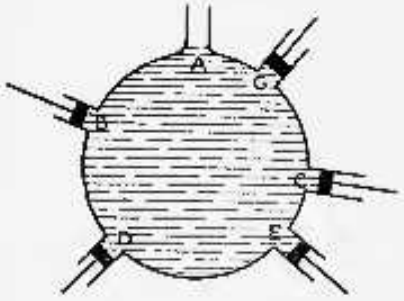

Fig. 1.

Then—especially if the vessel has considerable height and the liquid is mercury—we shall observe that, for the equilibrium of the liquid, each piston requires to be pressed in with a particular force the magnitude of which depends on two things: (1) the area of the piston, and (2) the position of the piston in the vessel.

The forces which urge the pistons out are due, of course,