

PREFACE

In the course of a number of years of experience in the practice and teaching of engineering, the writer has had frequent occasion to deal with the general theory of machine construction and to analyze the proportions of various parts. In many cases it is largely a question of designing the parts of sufficient strength, and the principles used in such work are of the greatest importance to the engineer and student.

The science of machine design generally does not deal with the principles on which the machine is constructed, nor does it attempt to determine the stresses acting on the various parts while performing their required functions; it rather assumes that these stresses are known and assists in the proper proportioning of the parts.

In the making of machines, however, it is necessary to know the effect of changing the length and position of a link, for example, the effect of lengthening the connecting rod of a steam engine and of off-setting the cylinder. Again the effect of changing the shapes of gear teeth and also the determination of the correct shape are matters of the greatest importance.

Then again, the turning effect on the crank shaft due to the steam or gas pressure, the relative merits in this respect of two and four cycle gas engines, of tandem and cross-compound steam engines, the turning moment required on the crank of a stone crusher to crush the stone, etc., are frequently necessary in the design of the machine.

Other important problems are the design of governors, the determination of the proper weight of fly-wheels to meet given conditions, the speed variations in various machines, the effect of the inertia of the parts, the effect of friction and the efficiency of machines.

None of the matters just mentioned come rightly under the head of machine design, although sometimes so treated, but form a separate study, and it is to such matters that the present treatise is devoted. These matters are not dealt with in an exhaustive manner, as the author feels that this would make the book too cumbersome, but the effort has been to make the treatise as suggestive as possible in the hope that the reader may work out his own problems with the help here given.

Some hesitation is felt about publishing this volume, partly because very much has already been written on the subject, and partly because the matter could not be dealt with as the author