Worm and Spiral Gearing

Halsey Frederick Arthur

Title: Worm and Spiral Gearing

Author: Halsey Frederick Arthur

Worm and Spiral Gearing

BY

FREDERICK A. HALSEY,

ASSOCIATE EDITOR "AMERICAN MACHINIST."

SECOND REVISED AND ENLARGED EDITION.

REPRINTED FROM
"AMERICAN MACHINIST."

NEW YORK:
D. VAN NOSTRAND COMPANY,
23 MURRAY AND 27 WARREN STREETS.
1903.

PREFACE.

JUSTIFICATION for the republication of the contents of this book is found in the still prevalent opinion among designers of machinery that worm gearing is necessarily short lived and of low efficiency, and in the fact that the methods of laying out spiral gearing are not as widely understood as the merit and convenience of that form of gearing make desirable.

The theory of worm gearing is well fortified by the collection of facts from experience given herein, and it points out clearly the procedure to be followed in order to insure durability and efficiency. Both analytical and graphical methods of laying out spiral gearing are given, and these, it is believed, will meet the needs and tastes of all.

It should be mentioned that with spur gears, when stock cutters are used, the diameters and center distances must be such as go with whole numbers of teeth. The property of spiral gears by which any center distance may be accommodated is therefore one which is not shared by spur gears. Should those sections of this book which relate to unchanged center distances be omitted, its remaining solutions would be as complete as is possible with spur gears.

As uncertainty has arisen in the minds of some readers, it should also be mentioned that the solutions here given relate exclusively to gears having their shafts at right angles.

CONTENTS.

PART I.

WORM GEARING.

PART II.

SPIRAL GEARING.

ILLUSTRATIONS.

The illustrations are too large to go in the text where they belong, and, with the exceptions noted below, will be found, folded, at the end of the book.

PART I.

WORM GEARING.

In view of the good results now being obtained with worm gearing, the old prejudice against that form of gearing, on account of its supposed low efficiency and short life, is dying out. These good results are the outcome of the application of principles which are by no means a late discovery, and it is expected that what follows will contain much that to some readers is not new. At the same time it is an undoubted fact that the best practice with worms is understood by but few, relatively speaking, and the corroboration of the theory by examples from practice which follow, is believed to be new. No better illustration of the fact that good practice with worm gearing is not

yet widely understood could be given than the statement in a recent and excellent work on gearing that "the diameter of the worm is commonly made equal to four or five times the circular pitch," the fact being that such proportions are distinctly bad if the worm is to do hard work.

It should be stated at the beginning that while what follows is not offered as a presentation of all the data necessary for assured success with worms under all conditions, it is hoped to make the general conditions of successful practice plain, and to present the "state of the art" as it exists to-day.

The essential change in practice which has improved the results obtained with worm gearing has been an increase in the pitch angle over what was formerly considered proper. There is no doubt whatever that this change has increased the efficiency of the gear, and, what is of more importance, has reduced the tendency to heat and rapid wear. This is