INVESTIGATIONS ON THERMAL TRAP TYPE SOLAR ENERGY COLLECTORS AND APPLICATIONS FOR DOMESTIC WATER AND SPACE HEATING

by

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for the award of the degree of
DOCTOR OF PHILOSOPHY

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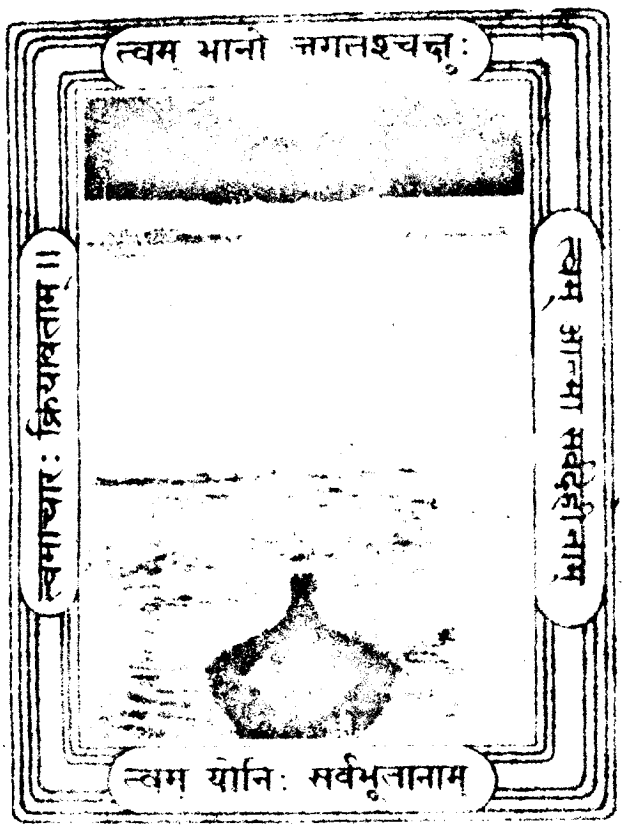

Tvam Bhano jagataschhakshuh,
Tvam atma sarvadehinam,
Tvam yonih sarvabhootanam
Tvamadharah kriyavatam

You, O Sun, are the eye of the world.
You are the soul of all embodied beings
You are the source of all creatures
You are the discipline of all engaged in v

DEDICATED TO MY PARENTS AND OTHER MEMBERS OF MY FAMILY BY THE BLESSING OF WHOM I HAVE BEEN ABLE TO RISE TO THIS LEVEL

CERTIFICATE

This is certified that the Thesis entitled, 'Investigation on Thermal Trap Type Solar Energy Collectors and Applications for Domestic Water and Space Heating' has been completed by Mr. Sant Ram under our supervision. It is original in nature and we have permitted the candidate to submit the Thesis for the degree of DOCTOR OF PHILOSOPHY in Solar Energy.

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S U M M A R Y

This thesis is a study of some novel concepts on solar water and space heating systems. In the conventional flat-plate collector, the cover is usually made of glass which is easily breakable and makes the weight of the total unit very heavy. In this thesis, it is proposed to replace the glass cover by an appropriate transparent plastic material which has not only the advantage of lighter weight but simultaneously (its conductivity being low) helps in trapping more of infra-red radiation in comparison to glass. This effect known as 'Thermal Trap Effect' has been studied in detail for flat-plate collector water heating systems with free and forced convection.

Some novel space heating concepts namely, the 'Roof Radiation Trap System', 'Transwall' and 'Ventilated Trombe Wall' have also been analysed and the performance has been studied for typical passive heating applications. In general, this thesis is a mixture of theretical and experimental work on 'Thermal Trap Flat-Plate Solar Energy Collector' and an analytical study of new passive concepts for space heating.

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