

## CONTENTS

The contents are not paged, the whole should be read with this page.

Dr. Joseph A. Holmes, director of the U.S. Bureau of Mines has said:

"Probably not over 11 per cent, of the energy in the coal is being effectively utilized. The remainder of the energy is lost through the inefficiency of the steam boiler. It is estimated that the boiler scale in locomotives alone in the United States, means a loss of 15,000,000 tons a year; it has been shown that scale one-sixteenth of an inch thick means a loss of 25 per cent. in boiler efficiency. The losses of carbon that is still pouring out of our chimnies, defacing monuments, buildings, and landscapes—are without valid reason."

Professor Goss, in Locomotive Sparks, said:

"The total weight of sparks and cinders passing the heating surface of the boiler of a locomotive \* \* \* may in connection with narrow fireboxes, equal 20 per cent. of the weight of coal fired."

27798 lbs. of five different samples of soft coal fired per hour in the Purdue locomotive, run at different speeds for tests produced 4308.86 pounds of cinders per hour. (The cinders were wasted combustibles.)

### COMPARED WITH THOSE SCIENTIFIC CONCLUSIONS.

Mr. Arthur Gilmour sat on top of the cab of C.P.R. locomotive 461, a narrow firebox locomotive, hauling freight trains, on tests which covered 560 miles, without suffering from smoke, only two fistfuls of cinders resulted, there was no soot nor scale in the tubes nor on the heating surfaces, and no sparks left the stack; proof was, so made, that the carbon monoxide was burned in the furnace.

I am of the same opinion as Dr. Holmes—that the losses from smoke, soot, cinders and sparks are without a valid reason.

In pursuing discoveries to abort the smoke nuisance, I discovered that in the production of free hydrogen to assure the combustion of the carbon monoxide, there was at even time with its production a natural way to avert explosions, the lives of the men in the cabs of the locomotives, held, so made, as safe as the lives of the passengers on the train.

Loss of life from explosions is also without a valid reason.