A Safety Survey

Shyrl G. Craig

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A SAFETY SURVEY

by

The rising toll of plane travel is bringing quickly to the attention of aviation authorities the need for a comprehensive program of safety measures. This paper presents a survey of current safety practices and recent developments in the field of aviation safety. It is a direct result of the recognition that the safety of the traveling public is of the utmost importance in the continued development of aircraft and air travel. The purpose of this survey is to provide valuable information to those engaged in the field of aeronautics.

I wish to express my appreciation to Dr. Albert W. and Mrs. Alice S. Williams, of Purdue University, for their guidance and support. Thank you also to the Department of Aeronautics of the University of Minnesota, for the opportunity to undertake this study. I am grateful to the many individuals who assisted in the collection of data.

Edward J. Taylor
M.S., Aeronautics

College of Education
Purdue University

1942
A SAFETY SURVEY

By

Shyrl G. Craig

A Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree
Master of Science

COLLEGE OF EDUCATION
BUTLER UNIVERSITY
INDIANAPOLIS
1940
The rising toll of accidents in this country is alarming. The death toll on our highways, the number of accidents and deaths in connection with holiday and vacation periods, and the terrific economic loss to the nation is a direct challenge to our educational system. We must educate our people. It is a direct obligation and responsibility that we who are engaged in teaching should understand fully the problems pertaining to accident prevention. This dissertation is written with the hope that it will commend the great work now being carried on in accident prevention, and stimulate further interest in the safety movement.

I wish to express my appreciation to Dr. Albert Mook and Dr. Richardson of Butler University, Professor Neyhart of the University of Pennsylvania, Dr. Noffsinger of the American Automobile Association for their interest and helpful suggestions in preparation of this manuscript. Much information, through interviews, was also given by Mr. Stivers, Sergeant Magnheimar and other leaders in safety. To these I also express my sincere thanks.

S. G. C.

Oakland, Indiana, 1940.
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A SAFETY SURVEY

CHAPTER I

INTRODUCTION

"It is the duty of every man to protect himself and those associated with him from accidents which may result in injury or death."

—Abraham Lincoln

One of the foremost subjects for country-wide consideration is our terrifying death and accident rate. Engineers, and government officials from city, state, and national government are directing unusual energies towards a partial solution of the problem. Without safety, the most important things in life are impossible to achieve and safe living is the keystone of our personal and national well-being. Accidents destroy economic security. Millions suffer privation and want when the bread-winners of the family are injured or when family savings are used up in caring for injured children. Our national economic loss from accidents amounts to billions of dollars annually. Property is destroyed, productive power is curtailed, and useful lives are prematurely snuffed out. Security, efficiency, prosperity, and happiness must not be sacrificed through carelessness or neglect.

Accident prevention is a complex problem. Many organizations
and agencies are contributing to the safety program. This study deals with the program now being carried out by many agencies and institutions. When life was relatively simple, the individual could rely upon his natural impulses; but today when life is becoming exceedingly complex, he needs something to supplement these natural impulses. Especially is this true in meeting certain dangerous situations. At one time man acted instinctively and could protect himself either by fighting or fleeing. Today neither way enables him to meet the mechanical forces which have supplanted the dangers of the past. There is need then for a more effective means of combating the dangers which have accompanied advancing civilization.1

Life finds its environment continually growing more complex. The individual is constantly thrown into many different and unusual situations. Society demands that the individual be a self-protective body and always conscious of the effects of its actions on group life. The individual, in turn, demands that society work out plans and programs increasing group efficiency and individual advancement. Safety is a key word in this process of individualization and socialization.2

Safety Education Defined

It seems pertinent to define safety education since it is to appear frequently throughout this study. Safety education is the training of individuals to avoid accidents to themselves and to prevent accidents to others. It involves the acquisition of a certain fund of information, the ability to apply this information to concrete situations, and the building up of habits which make the application of knowledge to situations automatic. Safety education means teaching the individual to adjust himself to our modern civilization, preparing him to meet successfully the recurring situations of life. For example to travel the streets safely he must be alert of mind and body, he must know something of the way traffic is controlled and kept moving, he must recognize the rights of others in the streets and be ready for any unexpected developments. What is true of safety on the streets is true of safety elsewhere. Safety education is a plan through which the philosophy of safety may be stimulated and promoted. It shows the way to the best of practices; those that have been tried through years of experiences and those atune with the best of educational trends. But there is a broader meaning which we must keep in mind if our teaching is to be

[References]

really constructive. Safety means something more than accident prevention - it means also conservation of all that goes to make life worth while - health, opportunity, and the material resources upon which life itself depends. Safety is the opposite of waste.

Education at present is judged in terms of modification of conduct or behavior in the individual and, from a social viewpoint, the outcome of education is judged by the extent to which it increases social effectiveness. For example, educational values are estimated in terms of health, citizenship, vocational fitness, the worthy use of leisure, ethical character, equipment for valuable home membership. Knowledge does not necessarily help one to greater effectiveness in any of these phases. Knowledge is valuable only when it shows itself in conduct. Probably the first of these objectives is that of providing education for a more effective conservation of the human element in our civilization. The conception of the purposes of education, as has been stated, will certainly imply that the agencies and organizations should attempt, as part of their endeavors, the conservation of human life and the promotion of welfare by the elimination of accidents. It appears that the very devices which increase our comforts involve greater need for safety education.  

7 Ibid, p. 12.
The Science of Safety Defined

Science is organized knowledge and so it is that the organization of facts concerning accidents has given rise to a new science. When machines began to appear in greater numbers during the nineteenth century, accidents increased proportionately. These accidents were accepted as a price we had to pay for putting the machines to work. It was thought that when workers had learned their use accidents would decrease. This conclusion seemed obvious, but events proved it false. Finally the situation became so alarming that studies were made of accidents and also of the conditions under which they occurred. Methods were devised for accident prevention. These efforts soon led to the application of scientific methods. As a result the new science of safety has appeared.

The Problem

This study is an attempt to show what is being done in the United States in the way of accident trends and accident prevention. The problem may be summed up in two specific questions.

1. What are present day accident trends?

To show present day trends, various types of accidents will be classified as follows: occupational, motor vehicle, other public (railroad, aviation, sports, etc.), home and school. The statistical method will be used. Tables, compiled from information received from prominent insurance companies, the National Safety Council, American Education Association, and the American Automobile Association, will show the trends of accidents.
in the past two decades.

2. What has been done in the way of accident prevention?

An analysis of present day conditions will be made from information collected from interviews with prominent leaders in the field of safety, newspapers, magazines, and books on the subjects of science and safety. It is hoped that conclusions from this study will show the tremendous value of organization, engineering, education and legislation in decreasing America's accident toll. Since the subject is not new it seems pertinent to begin the study with a brief history of safety beginning with primitive man and carrying it down to the present day.

Daily History of Safety

We cannot give a comprehensive history of the safety movement, but it is interesting to note that primitive man first learned that he could defend himself against the dangers of cold and hunger against the wild beasts with which the land was infested, and even against his fellows. Of course man, at first solitary or organized only in family groups, formed tribes and eventually the tribes united in status and religion. The very basis of such unions was the need of protection against the dangers of the people. It is probable that at first the only defense possible was paid by the leaders of the tribe as the government of the medly organized state were the obvious cases; man, beast, danger and cold. They had certain laws, it is true, to counteract the workings of evil spirits which were held accountable for a wide...
CHAPTER II

A BRIEF HISTORY OF THE SAFETY MOVEMENT

"The first law of nature is self-preservation; but, like all of the wonderful advances in human endeavor, it required the vision and faith of far-seeing man to make safety of the workers an essential feature of good management in the industries of our country. It is my sincere wish and hope that the day will come when the protecting arms of Universal Safety will spread out all over industry and reach all the millions of workers who make industry possible."

—Charles M. Schwab

Early History of Safety

There is no comprehensive history of the safety movement. Safety commenced, of course, when prehistoric man first learned that he must defend himself against the dangers of cold and hunger, against the wild beasts with which the land was infested, and even against his fellowman. But, as time went on, man, at first solitary or organized only in family groups, formed tribes and eventually the tribes united in states and nations. The very basis of such unions was the need of protection against the common enemies of the people. It is probable that at first the only enemies to which much attention was paid by the leaders of the tribe or the government of the crudely organized state were the obvious ones: men, beasts, hunger and cold. They took certain steps, it is true, to counteract the workings of evil spirits which were held accountable for a wide
variety of ills but, in general, the individual members of the community were left to take care of themselves. As civilization advanced, however, governments gradually assumed greater responsibility for the welfare of their peoples.¹

In the earliest days of recorded history, safety was given great attention. The Great Wall of China was built as a safety measure to protect the people from the invasion of enemies. We find that in the Old Testament, Deuteronomy 22:8, Moses made one of the first rules of safety:

"When thou buildest a new house, then thou shalt make a battlement for thy roof, that thou bring not blood upon thine house, if any man fall from thence."

We read about the soldiers of the Roman army, and learn that they fought with swords and lances, carried shields and wore helmets to protect themselves. The knights of old not only wore helmets and carried shields, but some of them also wore suits of mail, a kind of woven metal. They even put metal over their horses to protect them. Later, civilization found people organizing groups of men for protection. Sometimes these men formed the army; at other times they were sentries or guards. At a later date this latter group were replaced by organized police forces. The word "Police" means regulation and control of a community, especially with reference to the maintenance of public order, safety, health, etc.

A large part of the expenses of government, both state and national, as well as local, is caused by the fact that people want to be safe. They want to be safe in their homes, safe on the highways, and safe from disease. They want to be safe from criminals, from the weather and from scores of conditions which might cause unhappiness. Thousands of men are working at the expense of the government for the sole purpose of promoting safety in our daily lives. For example the Bureau of Animal Industry of the Department of Agriculture maintains thousands of meat inspectors on duty every day at meat packing plants. Pure food laws are made by the government for protection of the people. These are examples of the thousands of services rendered by our national government to make living safe. Civilization has made great progress; mankind is learning to protect itself from modern dangers by using modern methods.

The Growth of Machinery and Safety Methods

The history of man's effort to become civilized is a long and complicated tale of conquests of nature and of progressive changes in his ideas and standards of living. In his struggle upward from animal and primitive life he has devised many languages, religions, and forms of government. He has invented improved methods of trade and barter, machines for doing his work and for moving his goods about, and other means of making his life more comfortable and satisfying. 2 These

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2 Robbins Estelle Stockhol; Mark Arthur May; Richard Shelton Kirby; Sense and Safety on the Road, New York: D. Appleton Century Company, Inc., 1936, p. 5.
developments in religion, art, government, trade and commerce, agriculture and industry, education, social customs, and moral codes taken together, constitute civilization. In all of them machinery has played an important role.

In early times skilled laborers did all the work by hand because there were no machines to work with such as we have today. As men began to discover ways to use power to do work, they found it became necessary to develop safety devices to protect themselves. Each new invention brought with it a safety problem. With the beginning of the industrial revolution, that is, the period in history when many important machines were developed, the dangers to mankind also underwent a great change. For example, there was no danger from firearms prior to 1320 because gunpowder was not invented until that date. The steam boiler, which is very powerful because of high pressure of steam, had to be provided with a "safety valve." When the first passenger railroad was proposed, in 1830, the public declared that the engine would explode, that its flames would set fire to everything near it, and that other terrible things would happen! Certainly the early railroaders had great problems to face, and it was not until after George Westinghouse developed the air brake for railroads in 1868 that trains could be operated at comparatively high speeds with a great degree of safety. Today railroads provide the safest form of transportation we have. Other inventions which brought

safety problems were the automatic revolver 1835, dynamite 1867, the gas engine 1877, vulcanized rubber, 1859, the trolley car 1887, the bicycle 1815, and the airplane.

Just as the nineteenth century closed, there was thrust into man's hands a powerful and flexible means of locomotion, the gasoline-propelled vehicle. In the short space of a generation this vehicle has changed not only man's manner of living, but his entire outlook on life. Never before has a single invention accomplished so much, whether for good or bad, in so brief a period. The early automobiles did not create any great problems in safety except to those who used them. Of course, the newfangled machines frightened horses and caused runaways, but there were so few cars that pedestrians had little trouble in avoiding them, and there was not much likelihood of the cars running into each other. The machines and the roads of the time prohibited any great speed. But today conditions are quite different. Smooth streets and thousands of miles of concrete or "black-topped" highways, stream-lined cars capable of speeds over a hundred miles an hour, the great increase in population, and the fact that there are now in this country about 25,000,000 automobiles combine to make traffic accidents one of our greatest national problems.
The Safety Record of Industry

As our transportation system developed from 1900 on, automobiles came to be one of our chief manufactured products. Factories of all kinds increased their production. Machines manufacturing automobile parts and other kinds of machinery were greatly improved. As more and more working men were employed it became necessary to take steps to protect them from accidents. Insurance companies were busy trying to get employers to provide safe working conditions for the laborers. Soon laws were passed which made it necessary for the employer to compensate employees who were injured. In 1908 the first national workmen's compensation bill was passed which required the government to carry insurance on certain kinds of federal employees so that in case of accidents the government would pay sums to the injured or their families. Later, leaders of various companies began to work out plans to prevent accidents to their workers.

One of the first companies to take active part in the movement was the Illinois Steel Company. This was soon followed by other companies.

In 1906 the late Judge Gary issued the following historic instructions:

"The United States Steel Corporation expects its subsidiary companies to make every effort practicable to prevent injury to its employees. Expenditures necessary for such purposes will be authorized. Anything which will add to the protection of the workmen should not be neglected."

In 1907 there was held in the American Museum of National History in New York, under the auspices of the American Institute of Social Science, the first public exhibition of safety. In the same year the
newly-formed association of iron and steel electrical engineers appointed a safety committee. In 1911 the Mine Safety Association of America was formed.

The first Cooperative Safety Congress was held in Milwaukee, Wisconsin, 1912. Out of this meeting grew the National Council for Industrial Safety. In the following year its name was changed to the National Safety Council. This council has been the outstanding organization to promote safety in all kinds of activity in the past twenty-five years. In 1936 the National Safety Council adopted a five-year plan and set as its goal the reduction of deaths in automobile traffic thirty-five per cent by the end of 1940, or the equivalent of saving 35,000 lives.5

While the total of accidental deaths in industry is still high, as will be shown in the following chapter of this study, it would have been much higher had not a safety campaign been undertaken. But industry has shown that fatal accidents can be reduced. The lessons learned in industry are now being applied to other types of activity and many more lives are being saved.

5William B. Bruns; Hattie B. Fry; Safety, Chicago: Lyons and Carnahan, 1938, p. 17.
CHAPTER III

OCCUPATIONAL ACCIDENT TRENDS AND SAFETY FACTORS INVOLVED

During the last fifteen years we have spent upward of $170,000,000 for safety, sanitation, and employee welfare activities. These expenditures have been fully justified. They have been more than recovered in dollars and cents. But of far more importance than the recovery of expenditures, are the happiness and gratification resulting to our many thousands of employees and their families, as well as to the management, through good health and safety of life and limb, have been beyond computation, beyond any measure in dollars and cents.

--Judge Elbert H. Gary

Since organized safety started in industry, occupational accident trends and safety factors involved seem to be the natural beginning of this study. This type of deaths numbered 19,000 in 1937 and 16,500 in 1938, a thirteen per cent decrease. Injuries totalled 1,350,000 of which 60,000 were permanent. Direct costs were $580,000,000.1

Table I shows the occupational deaths from the years 1928 to 1938 inclusive and compares that number with the total number of accidental deaths.

---

1 Accident Facts, National Safety Council, Chicago: 1938, p. 3. (14)
TABLE I. OCCUPATIONAL DEATHS AND TOTAL ACCIDENTAL DEATHS,
1928 to 1938.

<table>
<thead>
<tr>
<th>Year</th>
<th>TOTAL</th>
<th>Occupational</th>
</tr>
</thead>
<tbody>
<tr>
<td>1928</td>
<td>95,043</td>
<td>19,000</td>
</tr>
<tr>
<td>1929</td>
<td>96,185</td>
<td>20,000</td>
</tr>
<tr>
<td>1930</td>
<td>99,147</td>
<td>19,000</td>
</tr>
<tr>
<td>1931</td>
<td>97,261</td>
<td>17,500</td>
</tr>
<tr>
<td>1932</td>
<td>89,031</td>
<td>15,000</td>
</tr>
<tr>
<td>1933</td>
<td>90,942</td>
<td>14,500</td>
</tr>
<tr>
<td>1934</td>
<td>100,977</td>
<td>15,000</td>
</tr>
<tr>
<td>1935</td>
<td>99,778</td>
<td>15,600</td>
</tr>
<tr>
<td>1936</td>
<td>110,062</td>
<td>18,500</td>
</tr>
<tr>
<td>1937</td>
<td>105,206</td>
<td>19,000</td>
</tr>
<tr>
<td>1938</td>
<td>94,000</td>
<td>16,500</td>
</tr>
</tbody>
</table>

Percentage Changes

<table>
<thead>
<tr>
<th>Period</th>
<th>TOTAL Change</th>
<th>Occupational Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1928 to 1938</td>
<td>-1%</td>
<td>-13%</td>
</tr>
<tr>
<td>1937 to 1938</td>
<td>-11%</td>
<td>-13%</td>
</tr>
</tbody>
</table>

Source: All accidental deaths calculated from U. S. Census Bureau data for 1928 to 1932; 1933 to 1937 are Census Bureau national totals; 1938 figures are National Safety Council estimates.

Figures in Occupational column are National Safety Council approximations based on data from U. S. Census Bureau, state and city registrars of vital statistics, and other sources. However, cars and trucks during the period from 1928 to 1932 the rate dropped sixty-one per cent, but in the next two years it went up slightly, and in 1934 was only fifty-seven per cent below 1928.
The 1938 death total was thirteen per cent below the 1937 figure of 19,000. There were also 19,000 deaths in 1928. During the ten-year interval, there were only three years with death figures below 1938. From 1928 to 1938 employee deaths on steam railroads dropped sixty per cent, from 1,447 to 684. During the same period, fatal accidents in coal mining declined forty-eight per cent, from 2,176 to 1,128. More people are killed in the course of farm work than in any other one industry. The agricultural death total in 1938 was 4,300 or twenty-six per cent of the all-industries total. Another twenty-four per cent of the deaths occurred in trade and service and seventeen per cent in construction. Two thousand work fatalities occurred in transportation and public utilities, and the same number in manufacturing. Work deaths in mining and petroleum industries numbered 1,500. About 2,800 occupational fatalities in 1938 resulted from motor vehicle accidents. This number will also be included in the table of motor vehicle accidents.

Industrial accidents rates decreased decidedly in 1938. The number of disabling injuries per million manhours worked (frequency rate) dropped sixteen per cent in companies reporting to the National Safety Council, and the days lost per thousand manhours worked (severity rate) decreased five per cent. During the twelve years from 1926 to 1938 the frequency rate was reduced a total of sixty-eight per cent. There were, however, ups and downs during the period. From 1926 to 1932 the rate dropped sixty-one per cent, but in the next two years it went up slightly, and in 1934 was only fifty-seven per cent below 1926.
The trend then reversed and reached a new low in 1936. The severity rate did not drop as rapidly as the frequency rate but the reduction was substantial. Following a sharp decrease of sixteen per cent from 1926 to 1927 there was little change until 1930. From that year on the decrease, although slow, was fairly steady. The 1938 rate was forty-five per cent below 1926. The trend is shown very clearly in the following table.

### TABLE II. INDEX NUMBERS OF OCCUPATIONAL INJURY RATES, ALL INDUSTRIES

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Frequency Rate Index (1926 = 100)</th>
<th>Severity Rate Index (1926 = 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TOTAL</td>
<td>Death and Permanent Total</td>
</tr>
<tr>
<td>1926</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>1927</td>
<td>86.6</td>
<td>84.0</td>
</tr>
<tr>
<td>1928</td>
<td>77.2</td>
<td>84.0</td>
</tr>
<tr>
<td>1929</td>
<td>74.1</td>
<td>84.0</td>
</tr>
<tr>
<td>1930</td>
<td>65.6</td>
<td>79.8</td>
</tr>
<tr>
<td>1931</td>
<td>45.5</td>
<td>67.8</td>
</tr>
<tr>
<td>1932</td>
<td>38.5</td>
<td>67.8</td>
</tr>
<tr>
<td>1933</td>
<td>41.2</td>
<td>59.4</td>
</tr>
<tr>
<td>1934</td>
<td>43.2</td>
<td>63.5</td>
</tr>
<tr>
<td>1935</td>
<td>36.9</td>
<td>52.1</td>
</tr>
<tr>
<td>1936</td>
<td>38.7</td>
<td>55.4</td>
</tr>
<tr>
<td>1937</td>
<td>38.7</td>
<td>55.4</td>
</tr>
<tr>
<td>1938</td>
<td>32.3</td>
<td>55.4</td>
</tr>
</tbody>
</table>

Percentage Changes, 1937 to 1938:

-16% 0 -14% -17% -6% 0 -16% -4%

Source: Individual company reports to the National Safety Council.
Decreases in the frequency rate were greatest for temporary disabilities. From 1926 to 1938 the reduction was sixty-nine per cent. For permanent partial disabilities it went down only twenty-three per cent, but for deaths and permanent total disabilities it dropped forty-five per cent. Decreases in the severity rate during the twelve years were almost the same for the three classes of disabilities. For temporary disabilities it went down forty-eight per cent, for permanent partial disabilities forty-five per cent and for deaths and permanent totals forty-five per cent. Until 1937 the rate for permanent partials lagged behind the others, but a drop of sixteen per cent in 1938 (compared with four per cent for temporaries and no change for deaths and permanent totals) brought the rate to the same level. Deaths and permanent total disabilities made up only one per cent of all injuries reported in 1938, permanent partial disabilities five per cent, and temporary disabilities five per cent, and temporary disabilities ninety-four per cent. In the severity rate, however, the position is reversed. Time charges for deaths and permanent totals were responsible for fifty-nine per cent of the total, permanent partials accounted for twenty-three per cent and temporaries for only eighteen per cent. The tobacco industry had the lowest frequency rate and the lowest severity rate among thirty industries tabulated for 1938. Second place in frequency was taken by the cement industry, third by steel, and fourth by textile. The corresponding places

in severity were taken by printing and publishing, rubber, and textile. Six of the twenty-eight industries tabulated for long-time trends reported decreases in their frequency rate of seventy-five per cent or more from 1926 to 1938. The foundry industry made the best record, with reductions of seventy-five per cent in frequency and eighty-seven per cent in severity. In the cement industry 1938 frequency was down seventy-eight per cent and severity declined sixty-four per cent.

The above figures seem high, too high, but they definitely prove one thing, namely that deaths in occupations are decreasing even in the face of a more complicated and accelerated machine age. It is the purpose of this chapter to show just what is being done by industrial organizations to make this decrease possible.

Factors Involved in Accident Decrease

LEGISLATIVE PROTECTION—Under the old common law any worker who was injured while engaged in his work could bring suit for damages against his employer. In order to win such a suit it was necessary for the workman to prove: (1) That the accident was not the result of his own negligence. If a man through his own carelessness had his hand mangled in a machine, he could not sustain a suit against his employer. (2) That the accident was not due to any careless act of a fellow worker. If the accident resulted from carelessness of some other workman, no suit against the employer could be sustained. In many cases, too, if the work was of the nature which is considered unusually hazardous, the workman took the job at his own risk.
Now, in most states, there is a Workmen's Compensation Act. It is a kind of compulsory insurance, under the provisions of which a worker who suffers an accident while working in the industry, or one who suffers from an occupational disease is entitled to receive benefits. In many cases the insurance is compulsory, and the cost of the insurance is paid for by the employer. Possibly such laws have been helpful in bringing about improved safety conditions in industrial work. The reduction of the worker's hours has also been a great stimulus to accident reduction.

SAFETY OFFICIALS IN INDUSTRY: For the past two decades or more, many large industrial plants have organized special divisions for the study and practice of safety. There is a Secretary of Safety and Sanitation who, with his assistants, studies the reasons for accidents and how to prevent them. He learns when accidents are most likely to occur, studies the machine and makes it less hazardous, studies the subject of ventilation, figures ways of removing poisonous gases and dust particles, and interests himself in the health of all the employees of the industrial organization. He is often known as the "Safety Director" or the "Safety Engineer." His duties are even more comprehensive. He plans for recreational activities for the workmen. Game rooms are provided in many factories where games are played and music is supplied for dancing during the noon hour. Baseball and track teams are organized and games are scheduled with rival factory teams. Provision is made in many factories to supply wholesome lunches at
low cost. These things help to build up the worker's morale and make him more contented. It has been definitely proven that cheerfulness of mind and its attendant alertness help to reduce accidents and to stimulate better health habits.

**Improvements in Buildings:** The campaign for safety in industry has brought improvement in the buildings in which factories are housed. At one time, the factory was likely to be a ramshackle building, smoky, dirty, dusty, and poorly lighted and ventilated. Now smoke consumers have been installed, outer walls are made entirely of glass, stairways are broad and well lighted, provisions are made for ventilation, fans remove dust and dirt, and the building is made fireproof. Workers in this more healthful environment are much less likely to meet with accidents.

**Improvements in Equipment:** The one-time factory presented a picture of machines crowded together, a perfect maze of belts, belt wheels, rods, and shafts which were a menace to the worker. No provision whatsoever was made to protect him. Electric motors are now used to drive the machines, and the intricate group of belt wheels and belts formerly used to drive machinery have disappeared. The men have room to work without crowding one another. In some factories the men are divided into different safety groups. They vie with one another in

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their efforts to reduce the number of accidents within a certain period. Prizes are awarded to the group or individual having the best accident record.

SAFETY DEVICES:—Since there are so many industries which have a great number of accident prevention devices it is impossible in a report of this size to name them all. A few varied protective devices however will be given. Too much cannot be said for them from the standpoint of lives saved through their use. Special clothing eliminates many serious accidents. The metal safety hat, foot and leg guard are indispensable in mines. Goggles and masks have saved thousands of eyes. Suits without pockets or metal and shoes without tacks have prevented many explosions in the high explosive chemical industry. The crusade for the worker, giving him every possible device for his safety, in having a definite effect on the accident curve. Whether the motive was a selfish one to avoid paying too high insurance rates for workmen’s compensation insurance, or whether it was more altruistic, the fact cannot be denied that industrial corporations have been successful in reducing the number of accidents in their plants. Passenger trains carry persons, millions of passenger-miles without fatal accidents. New York subways handle millions of persons yearly with only an occasional accident. Some factories report millions of man-hours worked without a single lost time accident. Eternal vigilance, safety education and supervision by safety engineers saved 1,600 lives in industry alone in 1938.

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Farm Accidents

In as much as farm accident decrease has not followed the decrease in other industries, it seems pertinent to give it special attention. Deaths from work accidents on farms numbered about 4,300 in 1938, a slight reduction from the estimated 1937 total of 4,500. The number of workers and the total hours worked was probably about the same in both years, but recent activities tending toward greater farm safety are having an effect in some parts of the country. For example, an intensive farm safety program was carried out in Kansas during 1938 by the State Safety Council and associated agencies, with the result that farm fatalities dropped to fifty-seven, from a total of eighty-three in 1937. This decrease is too large to be attributed to chance alone. Some educational work also was done by safety organizations in other states, and by farm equipment manufacturers. According to the classification of agricultural accidents made by the Kansas State Board of Health for the nine years 1930 to 1938, machinery accidents are more numerous than any other type. During these years they made up twenty-nine per cent of the Kansas total. Tractors were most important, followed by circular saws and combines. Fatal injuries by animals totaled twenty per cent, with kicks by horses, mules and cows most numerous. Excessive heat fatalities were ten per cent of the all-accident total, over half of which resulted from work in wheat and corn fields. Falls constituted another nine per cent of the deaths, and vehicular accidents made up nine per cent. Lightning caused five
per cent, the majority of these accidents occurring in a barn lot or field. Another four per cent were farmers killed by falling trees. All other types totalled fourteen per cent.

Farm accident reduction has certainly not kept pace with other industries. The reason is obvious as cooperative effort has been delayed in the case of farming. It, however, has been shown that farm accidents have been reduced. Education, better machinery and electrical wiring inspection, are the chief contributors to the decrease in fatalities and it is very probable that these factors will become more pronounced in the future.

The last chapter showed the remarkable record of industry. In this chapter a study of motor vehicle accidents will be given. Motor vehicle accidents in the United States during 1929 caused 11,300 deaths, 1,165,000 personal injuries, and an economic loss of $1,000,000,000. Every fifteen minutes someone was killed in a motor vehicle accident; every half minute someone was injured. The death toll in 1929 was equivalent to the destruction of Tuscarora, Arkansas; the injury total exceeded Cleveland's population. These statistics, to be sure, are alarming but nevertheless they show definite progress. Reduced fatalities, as are shown in the following:

CHAPTER IV

MOTOR VEHICLE ACCIDENT TRENDS AND SAFETY FACTORS INVOLVED

The public of the future will not be the tolerant, easy-going public of today. It will be a public that is more conscious of its rights and more insistent on having them. It will be a public that not only sees visions but that translates its visions into realities. It will be a public that sees that the automobile must and can be controlled. It is to such a public that we must look for the moral purpose and determination that will bring the automobile into its proper place in the world. --Albert H. Whitney

The last chapter showed the remarkable record of industry. In this chapter a study of motor vehicle accidents will be given.

Motor vehicle accidents in the United States during 1958 caused 32,400 deaths, 1,150,000 personal injuries, and an economic loss of $1,500,000,000.00. Every fifteen minutes someone was killed in a motor vehicle accident; every half minute someone was injured. The death toll in 1958 was equivalent to the destruction of Tucson, Arizona; the injury total exceeded Cleveland's population. These statements, to be sure, are alarming but nevertheless they show definite progress. Traffic fatalities, as are shown in the following

1 Accident Facts, National Safety Council, Chicago: 1959, p. 23. (26)
table, decreased eighteen per cent from 1937 to 1938, with a saving of 7,200 lives and 250,000 fewer injuries. These reductions occurred despite a one per cent increase in mileage. As a result, the 1938 mileage death rate set a new low. It was nineteen per cent below 1937 and thirty-two per cent below 1925. Every age group showed improvement.

#### TABLE III. MOTOR VEHICLE DEATHS, 1913 to 1938.

<table>
<thead>
<tr>
<th>Year</th>
<th>Motor Vehicle Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1913</td>
<td>4,227</td>
</tr>
<tr>
<td>1918</td>
<td>10,723</td>
</tr>
<tr>
<td>1923</td>
<td>18,394</td>
</tr>
<tr>
<td>1928</td>
<td>27,996</td>
</tr>
<tr>
<td>1929</td>
<td>31,215</td>
</tr>
<tr>
<td>1930</td>
<td>32,929</td>
</tr>
<tr>
<td>1931</td>
<td>33,475</td>
</tr>
<tr>
<td>1932</td>
<td>32,461</td>
</tr>
<tr>
<td>1933</td>
<td>31,363</td>
</tr>
<tr>
<td>1934</td>
<td>36,101</td>
</tr>
<tr>
<td>1935</td>
<td>36,369</td>
</tr>
<tr>
<td>1936</td>
<td>35,069</td>
</tr>
<tr>
<td>1937</td>
<td>35,645</td>
</tr>
<tr>
<td>1938 (est.)</td>
<td>32,400</td>
</tr>
</tbody>
</table>

#### Percentage Changes

<table>
<thead>
<tr>
<th>Period</th>
<th>Percentage Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1928 to 1938</td>
<td>+16%</td>
</tr>
<tr>
<td>1937 to 1938</td>
<td>-18%</td>
</tr>
</tbody>
</table>

Source: Calculated from U. S. Census Bureau data for 1913 to 1932; 1933 to 1937 are Census Bureau national totals; 1938 figures are National Safety Council estimates.
All types of fatal accidents declined from 1937 to 1938, except bicycle accidents, which remained unchanged. Deaths in non-collision accidents showed the greatest increase, twenty-five per cent. From 1927 to 1938 deaths in motor vehicle grade-crossing accidents dropped fifty-six per cent and in non-collision accidents twenty-five per cent. In contrast, deaths in two-vehicle collisions increased 154 per cent and those in fixed object collisions 180 per cent. Pedestrian fatalities, the most important single type of fatal accident, were responsible for thirty-nine per cent of the deaths in 1938, contrasted with forty-two per cent in 1927.

SEVERITY—For all types of accidents there are about thirty-five injuries for each death. Pedestrian accidents, however, are more serious on the average, their ratio being only twenty-two to one. The chance of fatal results is also greater than average for fixed object and non-collision accidents, which have ratios of twenty-six to one, and twenty to one. Most serious of all are grade crossing accidents, in which about one injury out of five proves fatal. At the other extreme are collisions between two motor vehicles, in which there are seventy-two injuries for each death, and electric car accidents, with a ratio of fifty-seven to one.²

Table III shows only the number of deaths during the year and cannot show whether or not improvement is being made due to the fact.

that machinery is being speeded up from year to year and the ever increasing number of automobiles. Statisticians have given us more reliable information by computing deaths per 100,000 population, per 10,000 motor vehicles and per 100,000,000 vehicle miles. Table IV gives us this information.

### TABLE IV. DEATH RATE TOTALS, 1913 to 1938

<table>
<thead>
<tr>
<th>YEAR</th>
<th>100,000 Population</th>
<th>10,000 Motor Vehicles</th>
<th>100,000,000 Vehicle Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1913</td>
<td>4.6</td>
<td>30.7</td>
<td>*</td>
</tr>
<tr>
<td>1918</td>
<td>10.1</td>
<td>13.8</td>
<td>*</td>
</tr>
<tr>
<td>1923</td>
<td>16.5</td>
<td>12.1</td>
<td>*</td>
</tr>
<tr>
<td>1924</td>
<td>17.1</td>
<td>10.9</td>
<td>*</td>
</tr>
<tr>
<td>1925</td>
<td>19.0</td>
<td>10.9</td>
<td>19.0</td>
</tr>
<tr>
<td>1926</td>
<td>20.1</td>
<td>10.6</td>
<td>19.0</td>
</tr>
<tr>
<td>1927</td>
<td>21.8</td>
<td>11.1</td>
<td>27.7</td>
</tr>
<tr>
<td>1928</td>
<td>25.8</td>
<td>11.4</td>
<td>27.4</td>
</tr>
<tr>
<td>1929</td>
<td>25.7</td>
<td>11.4</td>
<td>17.5</td>
</tr>
<tr>
<td>1930</td>
<td>26.7</td>
<td>12.4</td>
<td>17.4</td>
</tr>
<tr>
<td>1931</td>
<td>27.1</td>
<td>13.0</td>
<td>17.0</td>
</tr>
<tr>
<td>1932</td>
<td>27.6</td>
<td>13.2</td>
<td>16.1</td>
</tr>
<tr>
<td>1933</td>
<td>24.9</td>
<td>13.2</td>
<td>17.1</td>
</tr>
<tr>
<td>1934</td>
<td>28.5</td>
<td>14.6</td>
<td>15.4</td>
</tr>
<tr>
<td>1935</td>
<td>28.5</td>
<td>13.9</td>
<td>17.4</td>
</tr>
<tr>
<td>1936</td>
<td>29.7</td>
<td>14.6</td>
<td>16.4</td>
</tr>
<tr>
<td>1937</td>
<td>30.7</td>
<td>12.9</td>
<td>12.9</td>
</tr>
</tbody>
</table>

**Percentage Changes**

| 1927 to 1938 | 1.4%   | -1.5%  | -2.9% |
| 1937 to 1938 | -19%   | -17%   | -16%  |

*Data on vehicle-mileage prior to 1926 inadequate for computing rates.

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Table IV shows that definite progress is being made, insofar as there are decreases in most every case. The statistics given, although incomplete, are adequate proof of something being done in the way of motor vehicle accident prevention. The object of this chapter is to show just what is being done to make this decrease possible.

Factors Stimulating Accident Decrease

The possibilities in organized safety work are neither new nor untried. Twenty years ago accident conditions in industry were as intolerable as they are in traffic today. Industrial executives finally undertook the work of prevention but with the full expectation that they would pay heavily for it in reduced efficiency. They felt that the operating of guarded machines and the wearing of goggles would slow up production. Exactly the opposite proved to be the case. Many industrial plants reduced their accidents as much as eighty or ninety per cent, but along with this increase in safety went not a decrease but an increase in production.

The explanation of this was given many years ago by Sidney J. Williams of the National Safety Council by means of the following example: Suppose a casting falls off a loaded truck and seriously injures a man. For every such case there will be hundreds of cases where castings fall off trucks without hurting anyone. But in every one of these cases there was inefficiency; either the casting was broken or the truck had to be stopped and repiled. The injury to the man was only the spectacular evidence of an underlying inefficiency.
If we eliminate the causes that produce accidents, we shall at the same time rid ourselves of the causes that produce inefficiencies. In fact, industrialists now insist that the safety movement has played an outstanding part in bringing about the increased efficiency of modern industry.

A similarly organized movement is producing results in reducing traffic accidents. Traffic is moving more safely, delayed traffic is being speeded up and the public has begun to appreciate what is being done. We have three definite and effective points of attack: education, enforcement, and engineering.

**EDUCATION:** Of these education is the most important. This task has been given to the school and will be discussed in a following chapter.

**ENFORCEMENT:** Enforcement has to do with putting into effect the codes of good driving that have been established either on a basis of custom, ordinance or law. It presupposes that such laws and ordinances have already been set up where they were needed. And yet nothing is more characteristic of our traffic situation than the absence of such laws, unless it may be their abuse where they exist.

1. **Drivers' License Laws** – The two outstanding successes in the traffic safety field have been the work with school children and the work with commercial drivers. Both of these are characterized by the existence of authority, represented in the one case in the person of the teacher and in the other case in the person of the executive.
In order to control the traffic situation the driver must similarly be made responsible to some authority. Otherwise no pressure can be brought to bear upon him. The purpose of drivers' license laws is primarily to make the driver responsible. He is given a license to drive, not as a right, but as a privilege based upon proved character and ability and subject to forfeiture if it should be found later that he is not qualified. This is so obviously necessary as a basis for any effective control that it is not even debatable. Without a drivers' license law, we would have our streets filled with drivers who are physically, mentally, or morally unfit, types of persons that never should be allowed to assume the responsibility for driving a car.

2. Minimum Age Limit - It is just as necessary that provision be made for prohibiting driving before the age at which reasonable ability and discretion can be expected. Some states have no such laws, and in other states the age limit is much too low. What are probably the best laws, require a person to be eighteen years of age before he can get a regular drivers' license but allow him to have a junior license, containing certain restrictions, at sixteen.

3. Enforcement Agencies - The principal enforcement agencies are the police and the courts. The city police operate on the streets and the state police on the highways. Both have the power to arrest for violation of traffic laws. The work of the police must be supplemented by courts in which the cases that thus develop can be tried. The effectiveness of enforcement procedure is measured in a variety
of ways, among them: the adequacy of the police force, the training for the work, the means by which accidents and violations are investigated and prepared for trial and the way in which the cases are tried. There is all the difference in the world between a good quality of enforcement on the one hand and poor enforcement on the other.

4. Ticket Fixing - The most flagrant abuse in the field of enforcement and the most serious threat to our ability to deal effectively with the traffic problem is the setting aside of summonses for traffic law violations by authorities who have yielded to political pressure. Such a system of political favoritism in a community strikes at the very foot of effective enforcement, for an officer will not continue to subject himself to the unpopularity that will come to him from making arrests if he knows that these arrests will be set aside. Any self-respecting community can stamp out ticket fixing. Many communities have got rid of it entirely, but in some it is now so rampant as to have completely demoralized the work of the enforcement agencies. Communities that have eliminated this evil testify that the job can be done if it is done completely. In other words, persons in authority are only too glad to refuse such improper requests if they are assured that no one else can and will grant such favors. No half-way solution is possible. There is no more searching test of the earnestness, the sincerity and the integrity of a community than the question of whether its citizens are willing to face the consequences of their misdeeds on the highway; it is essentially a problem of the individual,
whether he has the character and the stamina to face the music.

Ordinarily a person will not violate traffic laws unless he is confident that he can get away with it. Otherwise his own self-discipline will keep him out of trouble. Thus, a vigorous enforcement policy will help achieve the goal of real enforcement which is self-enforcement; the citizen will not then need courage to face the music for he will not have committed an offense and there will be no music to face. Under such a system the traffic police will be free to confine their activities to accident prevention and the control of the chronic offender.

6. Schools for Traffic Police - The handling of the traffic problem is a science and an art which needs to be studied like any other science or art. Schools for the study of traffic control have been carried on in various parts of the country, notably at Evanston, Illinois, under the sponsorship of Northwestern University. A school has been conducted there for a two weeks period each year for the last three years and has been attended by police chiefs, lieutenants, and captains from all parts of the country. The work is partly done in the classroom but largely in actual demonstrations on the street. Such schools are greatly needed throughout the country, since at the present time there is little expert knowledge of the science of traffic control among enforcement agencies.

6. The Courts - One of the serious problems before our courts today is overcrowding. Cases often do not come to trial for months or years after they were entered on the docket. The traffic situation is largely responsible for this condition because of the great number of cases of both minor and major importance that have to do with either accidents or traffic law violations. One way to relieve the situation in large cities is by the establishment of special courts to deal with traffic violations. In small cities the cases should be tried by one specially assigned judge. A still more serious factor in the court situation is the general laxity with which the problem of traffic violations has been handled. The courts of the country cannot be maintained at a higher level than that indicated by the interest and concern shown by the public. The courts must necessarily reflect public opinion and they must depend for their support upon the force of public opinion. The same strengthening of moral purpose in dealing with the traffic problem that is needed in the general public is needed in the courts. A few outstanding judges with the support of their communities have dealt with the traffic problem in a highly forceful and intelligent way, and their work has indicated that the courts can play an important role in the control of accidents. When such an attitude becomes more universal we shall begin to make substantial progress in traffic law enforcement.

ENGINEERING - The engineering aspects of the traffic problem have to do with the automobile itself, the construction of the highway
and the operation of traffic on the highway, that is, with automotive engineering, highway engineering, and traffic engineering.

1. Automotive Engineering - There is no question that the modern automobile is a marvel of engineering accomplishment. From a mechanical point of view it is also an unusually safe piece of machinery, although there are certain minor improvements that can still be made. Its chief danger lies in its intrinsic qualities of power and speed. The speed question is outstanding and prompts several inquiries. Have we already exceeded the safe speed at which automobiles can be operated? Must progress now be made by putting governors on cars or otherwise reducing speeds? Or shall our policy be to control speed ourselves? In continuing to build more powerful cars the automobile manufacturers have undoubtedly followed the wishes of the public or at least a considerable part of the public. Nevertheless, it may well be asked whether they should not now, both for the good of the public and the good of their industry, make a serious effort to lead the public away from speed as an important issue. The recent emphasis on safety rather than speed is a significant move in the right direction. The manufacturers must also endeavor to lead the public away from the type of car in which the driver is seated so deeply beneath the cowl and the radiator that he cannot see the road for many feet ahead. This obstruction to his vision is a serious element of danger. The automobile industry for its own good must maintain leadership in producing a safe car.

2. Highway Engineering - Highway engineering until recently
was not primarily concerned with safety. There were other problems that had precedence. Recently, however, particularly in the case of super-highway construction, safety has assumed major importance.

Undoubtedly, one of the most promising means for bringing the traffic safety problem under control is the construction of super-highways, on which much of the through, swiftly moving traffic can be routed. These can be so constructed that the chances of an accident, for any other reason than downright bad driving, can be reduced to a minimum. This will clear the way for a much more effective enforcement of traffic control, such as for instance in the Holland Tunnel under the Hudson River, where the accidents have been negligible. So far as possible these same good features in the safe construction of highways must be incorporated into highways generally.

3. Traffic Engineering - The traffic engineer is concerned partly with the design of highways from a safety point of view but even more with the safe operation of traffic on highways and streets. This involves the layout of traffic signals, through streets, stop streets, one-way streets, safety islands and such things, as well as cooperation with enforcement agencies. With the help of the public there are important and effective things that can be done in the traffic engineering field, for obviously there are right and wrong ways to control traffic.

Organizations and Traffic Safety

While there is now coming to be a very general interest in the subject of traffic safety there are certain organizations, both governmental and private, that have either been charged with a particular responsibility, or that have assumed it. Some of these are the following:

1. United States Bureau of Public Roads - The United States Bureau of Public Roads is a division of the Department of Agriculture. It administers the Federal Highway Act. While it has been primarily concerned with the construction and maintenance of highways, the safety features of the task are well within its jurisdiction. With the growing importance of traffic safety this will be an increasingly important feature of its work.

2. United States Bureau of Standards - The United States Bureau of Standards has been conducting research and developing standards in the field of safety for many years. Much of its work has had to do with traffic, and much of the research that needs to be done from now on will undoubtedly clear through this organization.

3. United States Office of Education - The United States Office of Education in the Department of the Interior has interested itself in safety education for a number of years. It has published pamphlets for the use of schools and has helped materially to promote and coordinate the safety education activities of the country.

4. Interstate Commerce Commission - The Interstate Commerce Commission, by an act of Congress signed by President Roosevelt on
August 9, 1936, was given supervision over all interstate common motor carrier traffic and over interstate contract carrier traffic with certain exceptions. The supervision will be similar in general to that which it has exercised over railroad traffic. The act gives the Commission broad powers with regard to safety of equipment and safety of operation. The Interstate Commerce Commission has been largely responsible for the remarkable safety accomplishments of the railroads in the last twenty years. While the problem of truck and bus operation is intrinsically more difficult, it is believed that the Interstate Commerce Commission can accomplish parallel results in this field and that the standards which it may be able to set up will, with the cooperation of state authorities, help materially in regularizing automobile traffic in general.

5. The National Conference on Street and Highway Safety - The National Conference on Street and Highway Safety was formed in 1924. It is a semi-official organization under the chairmanship of the Secretary of Commerce and is supported partly by the Bureau of Public Roads and partly by organizations interested in the traffic safety problem. It was set up primarily to establish codes and standards that would form the basis for effective traffic control and that would serve as far as possible to put such control on a basis of national uniformity. The work of the National Conference has expressed itself particularly in the following: a Uniform Vehicle Code, a Model Municipal Traffic Ordinance and a Manual of Uniform Traffic Control Devices. Four
conferences have been held in Washington in 1924, 1926, 1930 and 1934. The National Conference has had an important influence on the traffic safety situation.

6. The American Association of Motor Vehicle Administrators - This is an association consisting of the officials having charge of automobile traffic in the various states. It has concerned itself, among other things, with the problem of traffic safety and will be influential in coordinating the safety work of the motor vehicle departments and in bringing about uniformity of traffic laws.

7. The National Safety Council - The National Safety Council was formed in 1912, primarily to deal with the industrial safety situation. It has a Public Safety Division and has played an important part in the development of traffic safety. It serves as a clearing house of information. It compiles statistics of accidents, which are published annually in a pamphlet entitled "Accident Facts." It publishes a number of magazines, including "Public Safety" and "Safety Education." For several years, it has conducted a traffic safety contest among cities. At the present time, some eight hundred cities are enrolled in this contest.

8. The American Automobile Association - The American Automobile Association has, for a number of years, been doing work in

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the traffic safety field. It and its member clubs are largely responsible for the establishment of school boy patrols.

9. The Automobile Manufacturers Association - This organization, among its many other interests, is taking an important place in the traffic safety field.

10. The National Bureau of Casualty and Surety Underwriters - The conservation of life and limb is a part of the work of the National Bureau of Casualty and Surety Underwriters, an association of stock casualty insurance companies. It serves as a clearing house of information not only for its own members but for other agencies, and it has taken an active part in the solution of the traffic accident problem, particularly in the development and promotion of safety education in the schools.

11. The American Legion - One of the activities of the American Legion has been in the field of traffic safety, and effective work has been done in many localities.

12. The National Conference of Parents and Teachers - This organization, with a membership of a million and a half, has an active committee on safety education, has already accomplished much and can be depended upon to be of very real help in getting the schools to take part in this work.

Competition Between Cities and States

There were 1,163 cities and forty-eight states entered in the National Safety Council's 1938 contest for fewest accidents.
Providence, R. I. was the grand prize winner with the fine record of six and three-tenths deaths per 100,000 population and two and five-tenths deaths per 10,000 automobiles. Other group winning cities were:

Milwaukee, Cleveland, Trenton, Saginaw, Waukegan, and Mason City, Ia.

Public enthusiasm, strict legislation, street and signal planning, radio and press, and education are some of the things responsible for these comparatively safe cities. Every year more cities are being stimulated into action.

The grand prize winning state was New Jersey. Other division winners were Oklahoma, Iowa and Washington.

**What Has Been Done in Indiana?**

Indiana was one of the later states to go into action in battling traffic hazards. For years she ranked among the states with a black fatality record. Hundreds of persons were losing their lives unnecessarily every year, and the state seemed to be unable to cope with the situation. In the past three years, however, she has shown remarkable advancement having profited by the experiences of other states and combining them with new ideas of her own. What Indiana has done may be taken as representative of nearly all states in the way of accident prevention. The following information is the result of interviews with Don F. Stiver, Indiana Director of Public Safety, Sargent Magenheimer, of the Indianapolis Police Department and others prominent in field of accident prevention.

First deliberate steps for promoting safer driving were taken
by former Governor Millard when he created the Department of Public Safety in 1933, enlarged and enhanced the activities of the State Police Department, and when he later organized the Governor's Committee on Public Safety. Honest, civic-minded, far-sighted citizens on the Governor's Committee met with the Director of Public Safety and devised legislative proposals revolutionary in their influence upon traffic safety in Indiana. Passed by the 1937 General Assembly, these laws greatly enhanced the activities of the State Police Department, gave the State Highway Commission greater powers in speed zoning and traffic regulations for safety, instituted a compulsory accident reporting system, established a driver's license examination law with provisions for suspension and revocation, and several other pertinent measures.

Governor Townsend took office in 1937 expressing his determination to make Indiana one of the nation's safest states. By creating his Governor's Co-ordinating Safety Committee, he brought together the Superintendent of Public Instruction, the Superintendent of the Indiana State Police who is also the Director of Public Safety, the Commissioner of Motor Vehicles and the Chairman of the State Highway Commission. At monthly meetings these officials integrated the various activities in the safety field to reinforce each other and better serve the public. State troopers were assigned to examine all school busses with a view to their safer operation, and to enforcement of the State law prohibiting motorists from passing a school bus which is loading or unloading children.
The motor vehicle commissioner set up a system for examining new drivers and enlisted State Police officers as examiners. The State Police Department, through its accident prevention bureau, supplies the Motor Vehicle Bureau with the names of all persons arrested for traffic violations or involved in traffic accidents reported to the department. As its contribution to the coordinating safety setup, the State Highway Commission created a bureau of traffic for the sole purpose of making traffic studies upon which engineering practices conducive to greater safety could be instituted. Center lanes and no passing zones were set up on state highway intersections, and curves with bad accident records were analyzed and engineering defects corrected. All accident data upon which these activities were based were secured from the State Police.

Every State department concerned with traffic safety was kept advised of each other's activities and rendered invaluable assistance in sharing data and facilities of mutual benefit. Recently the Coordinating Committee began the process of recodifying Indiana's traffic code to clarify every statute and bring it in accord with the most modern recommendations for safety legislation. As an energizer for traffic safety improvement and a clearing house for every agency seeking to bring about a betterment of the record the Co-ordinating Committee has been exceptionally successful. To obtain public co-operation through the press, the Co-ordinating Committee was fortunate in getting The C. I. T. Safety Foundation of New York to hold a seminar for
representatives of all daily newspapers in the State. First of its kind to be conducted in a specific state, the seminar brought in nationally known safety experts to acquaint working newspapermen with the traffic accident problem and to familiarize them with what the press could do to stimulate action toward the solution of the problem. Helpful guidance and personal attention to Indiana's needs have been obtained by the various agencies of the Coordinating Committee from the Field Service of the National Safety Council. The latest approved practices were installed by the National Safety Council's field representatives.

Every officer of the State Police Department received a week of intensive training in traffic control and accident investigation in the summer of 1938 from a staff member of the Safety Division of the International Association of Chiefs of Police. At the same time a personnel of commanding officers with duties devoted solely to traffic was established to carry out the program of selective enforcement installed by the Police Chiefs' Association. Thus the haphazard traffic control methods of relatively uninformed police officers gave way to the most careful analysis of each accident by investigating officers and a far more effective approach to the driving public. Through studies of the accident reports, the officers were assigned to accident areas during the hours when enforcement was most needed and were instructed to look for violations known to be causing much of the difficulty. Drunken driving was attacked scientifically by the use of the drunkometer.
and, under revised statutes concerning drunken driving, are issuing lighter penalties for first offenses and far more rigid ones for repetitions.

A firm control of the driving privilege is recognized as a safety measure by the Motor Vehicle Bureau. Physically unfit or incompetent drivers are refused permits or licenses, and actual road tests are given to new drivers before licenses are issued. Experienced drivers are permitted to build their own records through the individual driver's record file maintained by the bureau. All accidents, arrests or warnings for each driver are filed. A special hearing judge and his deputies in the bureau consider suspensions and revocations on the basis of these records. Experience to date indicates that persons who have been deprived of their driving privilege for ten, thirty or sixty days rarely find their way again into a license hearing because of their increased attention to the business of driving properly.

The Division of Traffic of the State Highway Commission has enlightened every branch of that service as to its safety responsibility in the building and maintenance of roads. District traffic engineers supervise the activities of this division in their local jurisdiction. This division received valuable assistance from the Yale University Bureau for Street Traffic Research. A uniform code of warning signs has been put into operation, dozens of railroad grade crossing separations have been constructed, more than 200 flasher signals for railroad crossings have been installed, bridges
have been widened and roads straightened. Dangerous curves and stretches of road have been zoned for definite speeds, although Indiana has no speed limit other than that consistent with safe and prudent driving at all other locations outside cities and towns. Studies of the traffic flow by the Commission reveal the changing needs and growing volume of truck and passenger traffic on the enormous network of improved highways in the State. Experiments in dual lane roads, rural highway lighting and other projects have been conducted.

Safety courses are required in the eighth grade for all public school students. Some type of credit course in safety education will be required in all the high schools beginning with the 1939-1940 school year. School safety patrols, sponsored by the Hoosier Motor Club, the Chicago Motor Club and other motor clubs throughout the State, have been organized in every city of any size in Indiana and in many rural areas. The first safety camp for the instruction of school safety officers was instituted in Indianapolis in the summer of 1937 and repeated in 1938 with striking results that gained nationwide publicity. These camps were financed by the Indianapolis Parent-Teacher Associations (public and parochial schools).

Inasmuch as Indiana operates one of the largest systems for transporting rural children from home to school and return, it is a significant fact that not one child has been killed as an occupant of a school bus in the last three years. The school busses travel more than 25,000,000 miles annually. Both Purdue and Indiana Universities
have conducted teacher training courses to enable teachers to instruct
their pupils in traffic safety. An Institute of Public Safety has
been established at Purdue and the university now plans the construc-
tion of a driving range for road testing of pupils in public schools
near the university. State troopers have delivered hundreds of safety
speeches in classrooms throughout the state.

In a recent effort to enlist the wholehearted support of the
Hoosier public behind the Indiana traffic safety program, the Governor
created the Indiana Traffic Safety Council comprising the leaders of
the civic, business, professional, industrial and education interests
of the state. Mindful of the public approval which must accompany all
successful official efforts to secure helpful legislation more efficient
enforcement, more competent driving practices, greater newspaper
cooperation and better general public support, the Governor has
requested the Council to cooperate with official agencies in formulating
activities such as the recodification of State traffic statutes and in
securing nonpartisan and influential backing for all worthwhile safety
ventures. Headed by Paul G. Hoffman, president of the Automotive
Safety Foundation and of the Studebaker Corporation in South Bend, the
Council bids fair to become a potent factor in the improvement of
Indiana's record. Indiana has shared in the nation-wide reduction of
traffic fatalities which began in November, 1937. Indiana traffic
deaths are down twenty-six per cent for the first ten months of 1938.
No one claims that the present comprehensive safety efforts are wholly
responsible for these reductions, but it cannot be denied that the State-wide program has been instrumental to a very large extent.

Although it has been impossible to go much into detail due to the tremendous amount being done on the subject of traffic safety, enough has been given to show that the 7,200 lives saved in 1958 did not "just happen." It has been the result of a well planned program which is constantly being improved and one that will show greater savings in the future.
CHAPTER V

OTHER PUBLIC (NOT MOTOR VEHICLE) ACCIDENT TRENDS AND SAFETY FACTORS INVOLVED

Men are rapidly coming to see that human life is of infinitely greater value than material wealth; that the health, happiness and well-being of the individual, however humble, are not to be sacrificed to the selfish aggrandizement of the more fortunate or more powerful. Modern thought is recognizing that the basis of national progress, whether industrial or social, is the health, efficiency and spiritual development of the people.

—John D. Rockefeller, Jr.

This chapter considers other public accident trends and safety factors. The term other public refers to railroad, aviation, sports, etc. More than half of all accidental deaths in 1938 were from mishaps that occurred when people were away from their work and away from their homes. The 1938 total of all public deaths was 48,900, representing fifty-two per cent of the death total from all causes. Almost two-thirds of the all-public death total is found in the one classification of motor vehicle accidents. There remain, however, 16,800 public (not motor vehicle) deaths, a total equivalent to all deaths occurring in work accidents in 1938.

Transportation accidents accounted for 4,960 deaths, equal to thirty per cent of the public (not motor vehicle) grand total. Railroad accidents were most important, with 2,800 deaths, mostly trespassers.
There were 950 fatalities in water transportation, 300 deaths each in street car accidents and air transportation, and 600 fatalities in accidents involving miscellaneous land vehicles.

Drowning was the most important single cause of death in the public (not motor vehicle) classification, accounting for about 4,700 fatalities in 1938. About one-half of these were persons under twenty-five years. Drowning deaths and firearm deaths, both of which occur most frequently among younger people, differ radically in their monthly incidence. Sixty-four per cent of all drownings occur from May to August. Firearm accidents, on the other hand, reach a peak in the fall and winter, forty-seven per cent occurring October to January.

Fall accidents take a heavy death toll in public places, just as they do in the home and at work. Two thousand seven hundred fatal falls are estimated for 1938, of which about three-fourths occurred to persons over sixty-five years of age. Among persons under twenty-five years, there are scarcely more than one hundred deaths a year resulting from falls in public places. Combining all types, fatalities in public (not motor vehicle) accidents are heavily concentrated in the younger ages. Sixteen per cent of the public accident deaths are among persons under fifteen years and thirty-three per cent of the victims are under twenty-five. For all kinds of accidental deaths these percentages are fourteen and twenty-seven.

Table V serves to show the trend of other public accidents from the years 1928 to 1938. A decrease of twenty-one per cent in the
ten years and eight per cent in 1938 in the face of an accelerated world is truly remarkable. The number of lives saved in 1938 totals 1,500. Again it might be repeated that this decrease did not "just happen," but has been the result of certain factors which will be pointed out in this chapter.

**TABLE V. PUBLIC (NOT MOTOR VEHICLE) DEATHS, 1928 -1938**

<table>
<thead>
<tr>
<th>Year</th>
<th>Public (not Motor Vehicle)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1928</td>
<td>21,000</td>
</tr>
<tr>
<td>1929</td>
<td>20,000</td>
</tr>
<tr>
<td>1930</td>
<td>20,000</td>
</tr>
<tr>
<td>1931</td>
<td>20,000</td>
</tr>
<tr>
<td>1932</td>
<td>18,000</td>
</tr>
<tr>
<td>1933</td>
<td>16,500</td>
</tr>
<tr>
<td>1934</td>
<td>18,000</td>
</tr>
<tr>
<td>1935</td>
<td>18,000</td>
</tr>
<tr>
<td>1936</td>
<td>18,000</td>
</tr>
<tr>
<td>1937</td>
<td>18,500</td>
</tr>
<tr>
<td>1938 (est.)</td>
<td>16,500</td>
</tr>
</tbody>
</table>

**Percentage Changes**

- 1928 to 1938: -21%
- 1937 to 1938: -8%

Source: Figures are National Safety Council approximations based on data from U. S. Census Bureau, state and city registrars of vital statistics, and other sources.
The following table (Table VI) lists the number of accidental deaths by type classification. For most types the accident fatalities have decreased.

TABLE VI. DEATHS FROM PUBLIC (NOT MOTOR VEHICLE) ACCIDENTS BY TYPE, 1938 AND 1937.

<table>
<thead>
<tr>
<th>Type of Accident</th>
<th>1938 Totals</th>
<th>1937 Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>16,500</td>
<td>14,000</td>
</tr>
<tr>
<td>Railroad—not with motor vehicle*</td>
<td>2,800</td>
<td>3,150</td>
</tr>
<tr>
<td>Street car—not with motor vehicle*</td>
<td>300</td>
<td>360</td>
</tr>
<tr>
<td>Other land vehicles—not with motor vehicle*</td>
<td>600</td>
<td>650</td>
</tr>
<tr>
<td>Water transportation*</td>
<td>860</td>
<td>850</td>
</tr>
<tr>
<td>Air transportation*</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Conflagration, burns and explosions</td>
<td>360</td>
<td>450</td>
</tr>
<tr>
<td>Drowning</td>
<td>4,700</td>
<td>5,000</td>
</tr>
<tr>
<td>Firearms</td>
<td>1,300</td>
<td>1,400</td>
</tr>
<tr>
<td>Falls</td>
<td>2,700</td>
<td>3,100</td>
</tr>
<tr>
<td>Other public accidents</td>
<td>2,600</td>
<td>2,900</td>
</tr>
</tbody>
</table>

Sources: Approximations by National Safety Council based on U. S. Census Bureau records and other data. 1938 details not yet available.

*These titles include deaths from falls, burns and all other causes arising out of the operation or use of the vehicles. The remaining titles cover deaths from non-vehicular public accidents.
Railroad

Data from the Interstate Commerce Commission shows that there were 4,879 deaths in railroad accidents (including grade crossing), compared with 5,764 in 1938—a reduction of sixteen per cent. This decrease, according to Interstate Commerce Commission figures, was accompanied by a decline of fifteen per cent in railroad traffic (as indicated by locomotive miles) and a seventeen per cent drop in hours worked. In 1923 the railroad employee death rate per million man-hours was 0.44. During the next six years it averaged above 0.35, but in only one year since (1938) has it been as high as 0.30. A low of 0.24 was achieved in 1931 and again in 1938. This rate represents a drop of forty-five per cent from the 1923 rate. With a few exceptions passenger death rates have gone steadily downward since 1923.

From 0.30 deaths per 100,000,000 passenger miles in 1923 the rate rose to 0.46 in 1925, then decreased quite steadily to 0.15 in 1931. In 1933 it jumped to 0.29; then dropped rapidly to 0.09 in 1937, which was seventy per cent below the 1923 rate. The 1938 rate of 0.36 represents a sharp advance, but is still much lower than passenger death rates for scheduled aviation or for motor vehicles. The prevention of trespasser accidents has been a particularly troublesome problem because it is difficult for the railroads to control the movement and actions of trespassers. The trespasser death rate per 100,000 locomotive miles varied between 0.16 and 0.14 from 1923 to 1930, then rose to 0.27 in 1933. By 1938 it had fallen to 0.21.
The record of grade crossing accident fatalities is fully as

good as that of passengers, taking account of the increase in motor
vehicle traffic during the past fifteen years. If grade crossing
defeats are stated in terms of rates per unit of travel (the unit being
the product of train-miles and motor-vehicle-miles) the rate for 1923
can be expressed as 1.71, for 1928 as 1.12, for 1933 as 0.93 and for
1938 as 0.68. There were 3,060 motor vehicle grade crossing accidents
in 1938 that resulted in injury or death. Of these, 1,629 occurred
during daylight and 1,460 at night. The difference in the circum-
stances of day and night accidents is significant. In eighty-two per
cent of the day accidents the locomotive struck the automobile and in
only four per cent did the car strike the train at some point back of
the locomotive. At night, however, only forty-six per cent of the
cases were described as "lociotive hit ear," while thirty-six per
cent were cases of the car striking a part of the train behind the
locomotive. 1

Factors Influencing Fatality Decrease

THE AIR BRAKE: In the year 1868 George Westinghouse gave the
world the greatest of all railroad safety devices, the air brake. At
first, air brakes were used only on passenger trains, and for another
ten years freight trains were stopped by muscle power. But in 1887
air brakes were adopted for freight use. Their rapid adoption after

1 Accident Facts, National Safety Council, Chicago: 1939, p. 49.
that time completely changed freight train operation. Heavy, fast
freights could be used because a method had been found to control
them. Another great improvement of the air brake was made in 1905.
Heavier and faster trains of recent years have been the cause of the
new "AB" brake development completed in 1933, which will work with and
gradually replace the old equipment. The "AB" system has been tested
and proved excellent for 150-car freight trains. It has a new operating
valve which gives faster, smoother, and better-controlled brake applica-
tions. Only eight seconds elapse from the time the engineer opens his
brake valve until the brakes set on the last car. The brakes do not
get stuck on cars using the "AB" system.

STREAMLINING—Experiments have proved that streamlining is
3 essential at high speeds. Wind-test tunnels were made especially to
carry out experiments in which the various designs of train cars could
be subjected to high winds. Recognized authorities in the field of
aeronautics were called in to determine the selection of architecture
for the first full streamlined train. Scientific studies proved that
the use of an aluminum alloy was practical. The new features seem to
be scientific, safe, solid, and entirely practical. The makers of this
new train have recently completed a new six-car train including three
pullmans. Two nine-car trains of similar design are also ready to be

2 George L. Bush, Theodore W. Ptacek, John Kovats, Jr., Senior
3 Ibid., p. 663.
placed in transcontinental service. These trains have been proved safer and tomorrow's train will certainly mark a new era in transportation progress.

**SIGNAL SYSTEMS:** Signaling systems have saved many lives. A railroad must not only have a method of stopping its trains, but it must know when to stop them. The necessity for signals, both to warn the engineer of dangers ahead and to tell him whether the track is clear, was recognized from the very first. At first a man was sent ahead with a flag to warn vehicles and foot passengers. Signals today are of two kinds, those which protect switches, junctions, and railroad crossings, and those which keep a safe interval between trains running on the same track. The latter are known as block signals. The steam whistle and bell are really more ornamental than necessary today. The staff signal was used in early days. There was one staff for a stretch of track between stations A and B. No train was allowed on that block without that staff. When a train reached station B the station master handed the staff to the engineer. The engineer carried the staff to A and handed it to the station master there. It was carried back to B by the first train running in that direction. With only one staff two trains could never be in the same block at the same time.

Various improved signaling systems were introduced from time to time until the closed circuit system came into use about 1879.

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In this system an electric current runs through the track. As the train approaches a block the electricity runs through the axle and back on the other track, operating the signal at the other end of the block. The danger signal is held in position until the train leaves the block, when the signal is cleared again. Present-day systems use both electricity and compressed air. In these systems the signalman throws over a little lever or switch, and immediately by means of magnets a distant signal, the control valve of an air cylinder opens and moves the signal arm. Many railways now use an automatic train stop. A rod, projecting down from the locomotive, touches a short length of raised rail at the side of the track. This short rail is in circuit with the signal. If the signal is at danger, an electrical impulse passes through the rail and locomotive contact rod and sets the brakes. This automatic train stop has already saved thousands of lives. Trainmen must pass rigid tests for ability to distinguish colors, for inability to distinguish between colors may be the cause of a serious wreck. Since 1909, color light signals have been used by the railroads. They have the advantage of being visible at greater distances. At night an engineer can see colored lights five miles ahead, and in the daytime they are visible more than a mile away. The usual colors and signals are: red—stop; green-clear; yellow—proceed with caution.

The above factors along with the building of over and under-passes account for the remarkable railroad accident record.
Air Transportation

The United States Civil Aeronautics Authority states that despite a seventeen per cent increase in passenger miles from 1937 to 1938, scheduled airlines reported thirty-eight per cent fewer passenger fatalities in domestic flying. The resulting rate of 4.6 deaths per 100,000,000 passenger miles was forty-six per cent below 1937 and eighty-four per cent below 1930. The 1938 rate was the lowest ever achieved, although only slightly better than the rates of 4.6 and 4.8 for 1933 and 1935.

As usual, the accident death rate for private flying was tremendously higher than for scheduled flying. However, the rate of 114.2 for non-scheduled operations was the lowest on record. It represented a seventeen per cent improvement from 1937 and fifty-one per cent from 1930. Thirty-four per cent of scheduled flying accidents during the last five years occurred when planes were making regular landings, and an additional fifteen per cent involved forced landings. In private flying these types of accidents were important to about the same degree, accounting for thirty-seven and sixteen per cent. In other types of accidents, however, there were contrasts. Eleven per cent of the scheduled flying accidents were described as collisions, contrasted with four per cent in private flying. "Spin and stall" accidents made up thirteen per cent of the private flying accidents.

but only three per cent of the scheduled operations mishaps.

In the average scheduled flying accident during the past five years, federal investigators have charged thirty-three per cent of the responsibility to personnel, and thirty-five per cent to the engine and plane. In private flying, the order of importance was reversed: personnel was charged with fifty-three per cent of total responsibility and engine and plane only twenty-six per cent.

Factors Stimulating Air Transportation Fatality Decrease

**SCIENTIFIC CONTROLS:** At frequent intervals during flight the pilots are in voice communication with dispatchers at the company's radiotelephone stations, established at every company field. Every plane is fully equipped with transmitting and receiving apparatus. The pilot can converse with a ground station dispatcher a hundred miles away as readily as business men talk from their offices by telephone. Thus the pilot is constantly informed of weather conditions prevailing along the airway ahead of him. The ground men are always aware of the exact location of planes in flight. In addition, the pilot of one plane flying over the airway may talk by radiotelephone with the pilot of another plane in flight.

To the casual traveler, air transportation may seem to be simply a matter of flying an airplane from one point to another. To him, the exacting measures which are constantly taken to insure his security may appear to be a less important matter than the question of reaching his destination on schedule time. But behind the scenes is
a highly efficient ground organization that plays an important role in maintaining reliable air schedules. Air transport operations must be conducted with thoroughness and exactness.

All instruments, controls, and switches have been scientifically arranged to insure easy use of them by the pilots. The flight instruments are grouped in the center of the panel, while the engine instruments are on one side of the board. As many as twenty-nine different indicators and gauges are located on the instrument panel. Indicators record every maneuver of the plane. These devices tell whether the plane is climbing or descending, whether it is turning or in level flight, how fast it is flying and at what altitude, and many other points about the plane's operation. The work of the more important instruments is duplicated by other devices. The artificial horizon constantly mirrors the exact altitude of the plane. The turn and bank indicators give the pilots the exact angle of the plane with the earth. The rate-of-climb indicator gives the pilots the exact rate of ascent or descent in feet per minute. The directional gyro records the direction of the flight and is supplemented by the compass. A sensitive altimeter registers elevation above sea level more closely than any other instrument. Before the company plane leaves an airport on a scheduled flight, it has been gone over "with fine toothed comb" to make sure that every part is in proper mechanical condition. A specially trained staff of mechanics is maintained at every service point along the route. After the plane has been fueled and cleaned,
it is subjected to a minute inspection by mechanics who are engine or aircraft experts. Should any part show need for repair or service, the job is accomplished under the competent supervision of the chief mechanic. No plane is released for flight duty until the inspection has been completed and any necessary service performed. At regular intervals the engines and even the entire planes are subjected to a complete overhauling.6

BEACON LIGHTS: The backbone of night air-transport schedules is the airway lighting system established by the Aeronautics Branch of the Department of Commerce.7 Along the airways, powerful revolving beacons are spaced at regular intervals, so the skyway from New York to the Pacific Coast is in reality an intermittently lighted boulevard. In uneven ground, flashing blinker signals are spaced between the large beacon lights. At intervals of thirty to fifty miles there is located a lighted rectangle designating a Department of Commerce intermediate field. In addition to the cabin illumination and navigation lights, each plane is equipped with three parachute flares, which can be released separately to illuminate and light an area of one square mile for a period of three minutes. The importance of night flying can be shown by the fact that planes sometimes fly so far as two


7 Ibid., p. 705.
thousand miles over night. The traveler finds that large cities, such as New York, Chicago, Kansas City, and Los Angeles, are sights not soon to be forgotten when seen from the cabin of a night-flying transport.

**RADIO FENCES:**- Probably one of the most astonishing aids to air transportation, especially during poor visibility, is the system of radio-beacon service installed by the Department of Commerce. The course of the airway is virtually "fenced in" by code signals sent out from radio stations along the route. While flying on the correct course, the pilot hears the signals as a steady note. If the pilot should shift to one side of the airway the tone changes to a dot-dash, dot-dash signal, and if he should deviate to the other side the signal changes to dash-dot, dash-dot. As a result, although the pilot may be unable to see the ground or follow light signals, the radio signals prevent him from leaving his course of flight.

**WEATHER REPORTS:**- Pilots flying over the air-mail passenger routes have the benefit of complete airway weather reports provided by the trained meteorologists of the United States Weather Bureau. With the aid of a system of observing and reporting posts at strategic points along the airway network, a constant and accurate check is kept upon weather conditions along the sky-ways. Forecasts are compiled at frequent intervals so that uncertainty regarding weather has been eliminated to a very great extent. The ground men and pilots are in touch with the latest weather information as soon as it is released. The pilots are not only advised of weather conditions.
directly ahead, but are promptly informed if any change in the weather is anticipated. This weather knowledge is of extreme importance to pilots of other than transport planes. Before taking off, the pilot receives an up-to-the-minute weather map, taken from the reports of the United States Weather Bureau stations. Three such stations, at Cleveland, Kansas City and Oakland, work together and dispatch weather maps covering eastern, central and western districts. In addition, the pilot checks over detailed reports of conditions of wind, ceiling, and visibility, received from numerous posts along the airway. After taking off, the pilot has at his command reports on weather conditions which are relayed regularly to the Department of Commerce airway radiotelephone stations, which in turn periodically broadcast weather conditions to their particular sector. In addition, if the pilot should desire to receive specific information on weather conditions at any particular point along that airway, he has only to radiotelephone to the nearest ground transmitting and receiving station, and the dispatcher will promptly provide the data requested. All the company radio stations received full airway weather reports on special teletypewriters. The weather observers also keep a check on the direction and velocity of winds aloft. This information enables the pilots to fly at the altitudes which provide the most favorable winds. Although a twenty-five-mile head wind may be prevailing near the ground, it is possible that a favoring tail wind is blowing a mile above the earth, and the pilot receiving this information from the Weather Bureau can select the best elevation.
The above factors plus improvements in the indispensable parachute are responsible for the remarkable record in aviation.

Sports Accidents

Swimming and hunting cause more accidental deaths. Estimates from the United States Census Bureau report that in 1937 there were 7,482 drownings of all kinds. Nearly twenty per cent of them occurred in water transportation accidents, automobile accidents and others that are clearly not associated with swimming. In 1937 these deaths totaled nearly 1,500. In addition, there were about 600 drownings of persons so young or so old that it seemed unlikely they drowned while swimming. Finally, there were occasional drownings of able-bodied persons who were in the water but not swimming—for example, building or repairing bridges, fishing, etc. In view of this evidence, the "drowning while swimming" total is estimated to be 5,000. Deaths from all firearms accidents in 1937 numbered 2,629. Census Bureau reports show 1,032 of these deaths as occurring in home or occupational accidents. Probably 200 or 300 were actually due to such accidents. Hunting accidents, therefore, probably resulted in not more than 1,400 deaths. National totals of other sports accidents are not available. Interesting data, however, are presented in a five-year summary of sports and recreation accidents (chiefly non-fatal) among policyholders of the Travelers Insurance Company. In this experience swimming accidents made up eight per cent of the sports accidents total. An average of $112 was paid on each claim, a little more than the average for all sports.
Hunting accidents constituted only three per cent of the accident total, but the average payment of $205 per case was two times the average amount paid on all sports accidents. Baseball accidents were more numerous (twelve per cent of the total) but the average payment was only $65 per case. Golf accidents made up eight per cent of the total, but were awarded only $80 per case. Boating and canoeing accidents amounted to five per cent, and an average of $135 was paid on them.

Table VI shows that there have been 900 lives saved in drownings, firearms, and falls alone. While it is impossible to show all factors contributing to this decrease, an attempt will be made to show a few of the outstanding aids.

SWIMMING—Swimming teachers deserve much credit for what they have done to make swimming safe. They have helped to lessen the fear that has always been associated with swimming and have saved thousands of lives. Much credit is also due the Junior Red Cross. This organization has long conducted a campaign for safety in swimming. Through swimming instructors it provides a program of tests which a swimmer may take to prove his skill and endurance. If he passes the tests successfully, he is given a life-saving certificate. Anyone holding such a certificate is supposed to be able not only to take care of himself but to help others as well. In view of the fact that swimming is very healthful, every able-bodied person should learn how to swim and how to

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swim carefully. If he acquires skill and exercises care, he can swim with a high degree of safety. This is proved by the fact that many more people swim today than formerly, but there has been no increase in the number of accidents. Swimmers are better trained, better informed about hazards, and consequently exercise greater care than they did a few years ago.

EDUCATION: No doubt the carry over from safety education in schools has played a great part in sports accident reduction but this discussion is reserved for a later chapter.

SAFETY DEVICES: The safety lock on firearms has saved many lives. This device will not allow a gun to fire accidentally. Improved boats and motors have contributed to the decrease in drownings. Radio and airplane have aided in finding lost parties. Poster propaganda has stimulated safety efficiency by improving the human mind—the greatest safety appliance.

SCOUT ORGANIZATIONS: The ever increasing number of scouts with their training and practical applications of proper life saving methods have done their part in the great war on accidents.

The public accident curve has been the most consistent in its decline and will probably continue to show slow but sure improvement through the efforts of education—it's chief contributing factor.

CHAPTER VI

HOME ACCIDENT TRENDS AND SAFETY FACTORS INVOLVED

The sense of security more frequently springs from habit than from conviction. The lapse of time during which a given event has not happened is, in this logic of habit, constantly alleged as a reason why the event should never happen, even when lapse of time is precisely the added condition which makes the event imminent. A man will tell you that he has worked in a mine for forty years unhurt by an accident, and offer this as a reason why he should apprehend no danger, though the roof is beginning to sink. The older a man gets, the more difficult it is to him to retain a believing conception of his own death. (Sils Marner)

Almost a century ago, John Howard Payne wrote a phrase into the lyrics of a song - "There's no place like home." Today that phrase has a new meaning. There is no place like home - for accidents. Each year, in what we are prone to call "safety of the home," preventable accidents kill more than 50,000 persons and injure between four and five million others. While today we are more acutely conscious of the tremendous toll of death and injury on our streets and highways, relatively little attention is being paid to accident prevention in the home, where Americans have been constantly inventing new and more ingenious ways of killing themselves, until home accidents account for thirty per cent of all accidental deaths and nearly half of all accidental injuries.
TABLE VII. HOME ACCIDENT FATALITIES, 1928 - 1938

<table>
<thead>
<tr>
<th>Year</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1928</td>
<td>30,000</td>
</tr>
<tr>
<td>1929</td>
<td>30,000</td>
</tr>
<tr>
<td>1930</td>
<td>30,000</td>
</tr>
<tr>
<td>1931</td>
<td>29,000</td>
</tr>
<tr>
<td>1932</td>
<td>29,000</td>
</tr>
<tr>
<td>1933</td>
<td>29,600</td>
</tr>
<tr>
<td>1934</td>
<td>34,000</td>
</tr>
<tr>
<td>1935</td>
<td>32,000</td>
</tr>
<tr>
<td>1936</td>
<td>37,000</td>
</tr>
<tr>
<td>1937</td>
<td>32,000</td>
</tr>
<tr>
<td>1938 (est.)</td>
<td>31,500</td>
</tr>
</tbody>
</table>

Percentage Changes

1928 to 1938: 15%  
1937 to 1938: -2%

Source: Figures are National Safety Council approximations based on data from U. S. Census Bureau, state and city registrars of vital statistics, and other sources.

The above table shows the 1938 home accident death total was approximately 31,500, a decrease of less than two per cent from the 1937 total of 32,000. In contrast, all other classes of fatal accidents showed large reductions.

In addition to the deaths, home accidents last year resulted in non-fatal injuries to about 4,650,000 persons. Most of these caused disability of only one or two days, but approximately 140,000 resulted in some degree of permanent disability, ranging from the...
amputation of a finger or the stiffening of a joint, to loss of sight or paralysis. Wage loss, medical expense, and the overhead costs of accident insurance accompanying home accidents in 1936 amounted to about $600,000,000.

Falls are the most important type of fatal home accident. Nearly half of last year's home deaths were falls. The next most important type was conflagrations, burns, and explosions, which included seventeen per cent of the 1936 total. Poisonings (excluding poisonous gas) constituted only five per cent, and no other type was as much as four per cent. Estimates cannot yet be made on the ages of persons killed in 1936, but in 1937 deaths of persons sixty-five years or older made up half the total for all ages. The death rates per 100,000 population were: 0 to four years, 62.0; five to fourteen years, 9.5; fifteen to twenty-four years, 6.7; twenty-five to sixty-four years, 10.8; sixty-five years and over, 200.1.

A study made by the Kansas State Board of Health covering 1933 to 1937 records for that state, shows that twenty-nine per cent of the fatal falls occurred in the bedroom, twenty-six per cent in the yard or in other buildings on home premises, and fourteen per cent in the living room. Fatal burns were distributed as follows: kitchen, thirty-four per cent; yard and other places outside the house, fifteen per cent; and living room, thirteen per cent. A study made several years ago of hospitalised home accidents in Chicago indicated twenty-three per cent of the accidents on stairs.
(inside and outside), yard nineteen per cent, kitchen eighteen per cent, and living room nine per cent. In this same study of hospitalized cases it was found that sixty-four per cent of all accidents had some mechanical cause, and that sixty-eight per cent had a personal cause, indicating that the majority of cases had both a mechanical and a personal cause. The most frequently noted mechanical causes were: disorder, improper equipment, and improper use of equipment. The more common personal causes were: poor judgment, adult faults resulting in child injuries, and physical frailty.¹

The men of the house are quite as much in need of education in the art of safe living at home as are the women. While it is true that men are less likely to suffer minor injuries in home accidents, their chances of being killed are much greater than are those of women. In a recent study of mortality among Industrial policyholders of the Metropolitan Life Insurance Company ² it was found that fatal accidents in the home were one and one-half times as frequent among males as among females in the broad age range fifteen to sixty-four years. This excess among males is the more remarkable when it is considered that, at this time of life, men spend a large part of their active hours away from home, in industry, while women’s chief

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chief occupation is the care of the home.

In the age group fifteen to sixty-four falls caused slightly less than half the deaths for each sex and were about one third more frequent among men. A review of the circumstances surrounding these accidents as reported on the death records shows that falls off roofs, ladders, porches, and balconies were much more frequent among men, a fact which suggests that many had attempted repair jobs for which they were not qualified or for which they did not have the proper tools. Falls down stairs, by far the most important type of fall, were also more frequent among men than among women.

Deaths from poisonous gas were three times as frequent among men. Illuminating gas was the lethal agency involved in three fifths of the deaths, and automobile carbon monoxide gas in one fourth of the deaths among males. The escape of illuminating gas is due to a variety of causes; to flexible pipe becoming detached from heaters, to inadvertent turning of gas jets, to defective tubing, leaking gas fixtures, or to the extinction of gas flames by overboiling water or by a gust of wind. Deaths by carbon monoxide poisoning occur when automobile motors are run in home garages with doors and windows closed. A surprisingly large number of deaths by gas poisoning occur from the careless manipulation of appliances by men who are under the influence of liquor. There are many deaths included here also which would undoubtedly be classified as suicidal if we were in possession of all the facts.
Firearms were the third most important cause of male mortality, but of little importance among women. Deaths due to cleaning guns or careless handling of loaded guns caused 1.2 deaths per 100,000 male policy-holders but only 0.2 per 100,000 females.

By way of contrast, it is interesting to observe that accidental burns, exclusive of those sustained in conflagrations, were the only type of home accident in which more women than men were injured fatally. Fatal burns in the home occur about twice as frequently among women as among men. Nevertheless, the male mortality rate of 1.1 deaths per 100,000 was not inconsiderable. The facts presented here indicate that there is a very definite need for an intensive study of the unsafe practices of men at home in their off hours. It is felt that this phase of the home accident prevention problem has not hitherto been given the consideration which its importance manifestly deserves.

Causes of Home Accidents

Millions of dollars are wisely spent each year for the defense of the home from outside dangers. Our national forces - army, navy, air corps, afford protection against foreign invasion. In our communities we are guarded against dangers from without by efficient police and fire departments. In practically every home are dangers which are beyond the power of the above agencies to control. These inside hazards are causing thirty per cent of all accidental fatalities.
The following table shows the principal types of accidents occurring from the inside.

**TABLE VIII. DEATHS FROM HOME ACCIDENTS, 1938.**

<table>
<thead>
<tr>
<th>Type of Accident</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>31,500</td>
</tr>
<tr>
<td>Poisonings (gas excluded)</td>
<td>1,600</td>
</tr>
<tr>
<td>Absorption of poisonous gas</td>
<td>1,000</td>
</tr>
<tr>
<td>Conflagrations, burns and explosions</td>
<td>6,300</td>
</tr>
<tr>
<td>Mechanical suffocation</td>
<td>1,200</td>
</tr>
<tr>
<td>Firearms</td>
<td>1,000</td>
</tr>
<tr>
<td>Falls</td>
<td>16,600</td>
</tr>
<tr>
<td>Other home accidents</td>
<td>4,900</td>
</tr>
</tbody>
</table>

Source: Approximations by National Safety Council, based on U. S. Census Bureau records and other data. 1938 details not yet available.

Falls in 1938 accounted for 16,000 deaths in the home and nearly fifty per cent of the injuries. The Travelers Insurance Company paid more than fifty per cent of its claims for home accidents caused by falls. This company mentions such things as balancing chairs on their rear legs, careless of the possible results of a miscalculation; climbing up on shaky chairs or rickety ladders and then over-reaching; slipping on polished or wet floors, or floors upon which food has been

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spilled carelessly; catching toes and heels on torn coverings on stairways; tripping or falling as the result of stepping on accumulations on stairs and floors; as being the major causes of falling accidents that injure and kill so many persons every year. Darkness is another contributory cause of falls. Collisions with objects placed around a room, harmless as they may seem, cause many accidents.

Poisoning is another hazard of the home. Carbon monoxide from coal, oil and gas burners and from the ordinary manufactured gas burned in kitchen stoves kills a thousand persons every year. From furnaces carbon monoxide escapes with other gases from faulty flues and firepots, enters hot air pipes and is carried to rooms above. One of the most common mistakes is failure to pipe exhaust gases from the kitchen stove to the outside. In every home medicine cabinet there are poisons. Not a day passes without someone, whose eyes were falling or whose hand just happened to grasp the wrong bottle, being poisoned; from the yearly totals the average is about five such cases each day.

Cuts, burns and scalds account annually for about sixteen per cent of home accidents, with cuts the most prevalent. Too common are the most horrible of all home accidents, scalds and burns. They cause more than 5,000 deaths each year and injure many more, often causing lifetime disfigurement. Explosive cleaning fluids and gasoline provide another source of home injury that claims a yearly toll of more than a thousand lives.
Almost every day the papers record some accident that might
have been prevented had someone taken the proper precautions in
equipping or handling an electrical appliance, fixture or wire.
Countless examples on record prove that there is ample power in an
ordinary 110-volt house circuit to kill a human being. The bath,
kitchen and laundry are the electrical danger areas. Although many
of the comforts and conveniences of the modern home are due to
machines of one kind or another, designed for safe operation, they
too provide hazards. Electric fans and food mixers cause painful
injuries to hands and fingers, and the roller-type wringers on
washing machines have a long record of injuries and even fatalities.
These are only a few of the many causes of accidents in the home.

What is Being Done?
A glimpse at Table VII shows no decided decrease in home
fatalities. This is particularly interesting due to the fact that
the home is the only institution where a definite accident prevention
program is not being carried out. It is true that certain appliances
are being improved and being made more safe such as rubber bladed fans,
guarded machine gears, etc. Washing machine wringers are being
improved, with larger, softer rolls and quicker acting release catches
that make it possible for the person caught by a hand, arm, hair or
clothing to stop the wringer and release himself before any great
injury is done. The decrease in accidents due to these improvements,
however, is overcome by an ever increasing number of new appliances
which are daily introduced into homes to make home work easier, but it seems that these same devices tend to increase the number of accidents. The necessity of inspecting electrical wiring in homes has probably saved many lives. Many machines used now in the homes are required to pass rigid government tests.

The education today of the home-makers of tomorrow cannot but make the home of the future safer and better than any in the past.
CHAPTER VII

SCHOOL ACCIDENTS; THE IMPORTANCE OF SAFETY EDUCATION

Keeping one's self and others free from accident is one of the earliest aspects in which life presents itself as a problem. Children instinctively recognize the practical importance of safety, and their interest in it is spontaneous and enthusiastic. Furthermore, the accident toll has reached such alarming proportions that it is necessary for the school to cooperate with the home and with other agencies in carrying on a continuous safety education program.

—Horace Mann Buckley

Present Conditions

Organized safety education has made a remarkable record in saving lives and preventing accidents. In 1922, when attention first became sharply focused upon the need of safety education, 18,676 children under the age of fifteen years lost their lives by accident. In 1938 the accident toll of childhood was 13,900. The reduction was accomplished in spite of the increasing hazards of speed and the machine. Had child fatalities increased at the rate of adult fatalities in the same span of years, the total number of accidental deaths among children would have been larger than it was by 97,000.

Safety organizations and schools working together have been largely responsible for this remarkable achievement.

Only 6,750 children five to fourteen years old were killed in accidents during 1938 — the smallest death total recorded in twenty-five years. From the high point of about 10,000 deaths in 1918 and 1919 this represents a drop of more than thirty per cent. No other persons, younger or older, have even approached this record. The rate for children under five years went down fifteen per cent from 1922 to 1938. In the age groups fifteen to twenty-four and twenty-five to sixty-four the rate decreased two per cent and one per cent respectively, and among older persons it rose twenty-seven per cent.

A complete record of all student accidents resulting in lost time or doctor’s care is kept by school systems with more than 800,000 enrollment. A summary of the accidents occurring in the seven months from September, 1938, to March, 1939, shows that nineteen per cent of them occurred in school buildings, eighteen per cent on school grounds, seven per cent going to or from school, twenty-four per cent at home and thirty-two per cent at places away from school or home and outside school hours. Briefly, forty-four per cent occurred on school property or on the way to or from school, and fifty-six per cent at other places. Because enrollment varies from grade to grade the student accident situation can be most accurately stated in terms of rates per 100,000 student days. Rates for the seven months from September, 1938, to March, 1939, show that in cooperating school
systems the record is most favorable in the lower grades. In the kindergarten the accident rate was only six, in the first grade eleven, and in the second grade twelve. It continues to advance, reaching seventeen in the sixth, seventh and eighth grades. A decline then occurred, to an average of about fifteen in high school. Absence from school averaged 3.1 days per accident for all grades. In the kindergarten, however, the average was 5.6 days, in the first grade 4.0 days, in the fifth, sixth, and seventh 5.2 days, and in the high school only 2.5 days.

These figures serve to illustrate the fact that the schools and education are doing a remarkable piece of safety work. It is the purpose of this chapter to point out just what the school with its "New Baby," safety education, in the curriculum is doing.

The Present Status of Safety Education

The latest and most complete information concerning the present status of safety education has recently been given out by the National Education Association. In November 1937 the Research Division mailed a questionnaire to a random selection of 100,000 teachers, members of the association. Replies were received from 14,824 teachers in elementary, junior high and senior high schools. The Research Division attempted to find the extent to which safety instruction is offered,

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its place in the curriculum, the individual responsible for the safety program and the methods of teaching and their relative value.

EXTENT TO WHICH SAFETY INSTRUCTION IS OFFERED IN CITY SCHOOLS:

SYSTEMS: Replies from 14,688 city school teachers indicate that safety education has a definite place in the schools and that only 2.6 per cent failed to report some kind of instruction in safety. The elementary schools surpass the junior and senior high schools in respect to the proportion of teachers reporting safety instruction. Of the 6,939 elementary-school teachers reporting, 99.3 per cent replied that their schools provided for safety education by having all or some of the teachers assist in the subject. Less than one per cent of the elementary-school teachers reporting in this study fail to teach safety in some way. Of the 6,939 elementary-school teachers whose schools include safety in their program of studies 85.3 per cent reported that all teachers participate in the teaching of safety. Safety education is given extensive attention however the intensiveness and effectiveness of this instruction may be less than are desired.

Relatively fewer of the junior high-school teachers appear to recognize the need for safety education. Of the 2,766 junior high-school teachers reporting, 41.6 per cent participate in the safety program. On the other hand more junior high-school teachers than elementary-school teachers reported that safety is taught by some, rather than all, teachers. This is due to the fact that junior high-school teachers are assigned their places by subject
rather than by grade and cannot as readily correlate safety with their particular subjects, unless it is assigned to them, as elementary teachers. The same general situation as that in the junior high-schools was noted in the report of 4,875 senior high-school teachers, but to a greater degree. Nearly three-fourths of the senior high-school teachers reported that some of the teachers in their schools aid in carrying out a safety program, while less than one-fourth reported that all teachers participate in safety instruction. The replies of all teachers showed comparatively few offering definite instruction regardless of the size of the cities in which they were teaching.

The above facts show that most of the elementary schools are now doing a certain amount of work in the field of safety education and the high schools are rapidly falling into line. Thirty states or more have published state courses of study and more are being prepared. Perhaps the most convincing evidence of the importance of the subject in the estimation of educators was the action of the American Association of School Administrators in making safety education one of the principal subjects for discussion at its meeting in New Orleans in 1937 and in making it the subject of its 1940 yearbook, an action that should be interpreted as meaning that safety is considered the most important subject for discussion at the present time.

PLACE OF SAFETY EDUCATION IN THE CURRICULUM:—The problem of the curriculum is one of the most fundamental, most unsettled and most never-to-be settled problems of education. A curriculum must on the one hand be based upon an educational philosophy and it must on the other hand meet the practical conditions of life. Therefore, as philosophies change and as the conditions of life change, so curricula change.

One of the most important problems in the field of safety is that of fitting this subject into an already crowded school curriculum. Each school must meet the conditions of its community and determine the place in its curriculum which will seem best to serve its specific needs. By the very nature of the subject it can be correlated with other subjects, but the problem now seems to have become so big that little can be done through the limitations of correlation. At the present time about eleven per cent of the schools teach it as a separate subject, twenty-eight per cent correlate it as a distinct unit with other subjects, nine per cent include it in auditorium programs only, ten per cent include it only in extra curricular activities, twenty-seven per cent refer to it incidentally, fourteen per cent combine above mentioned methods and one-half per cent do not teach it in any way.

Informal instruction through clubs, patrols, etc., is being carried on to a large extent in many schools. The Junior Safety Council is an important part of an all-school activity program.

Through this representative organization consideration may be given to safety problems of general interest as well as to specific hazards of school, neighborhood and season. The council offers a channel through which safety information may be readily disseminated; it provides the machinery necessary when pupils wish to bring a special project to the attention of the whole school. It gives children an opportunity to take an active part in the safety movement and to have experience with simple organization and parliamentary procedures. The function of the School Safety Patrol is to instruct, direct and control members of the student body in crossing the streets at or near the schools.

Methods of Safety Teaching Now Employed

All types of teaching techniques from real life situations to those of essay contests are now employed. The National Education Association survey shows the two most popular methods are bulletin board display of posters and pictures on safety and classroom forums and general discussion of accidents and safety problems. From two-thirds to three-fourths of the schools are using these methods.

Driver training appears in less than ten per cent of the schools. Although this is one of the most valuable methods of teaching its low frequency is due to the difficulty encountered by most schools in obtaining funds, instructors, equipment and time. Professor Neyhart of
Pennsylvania State College has done a remarkable piece of work in the high school at State College. He has combined actual road instruction with the classroom course. Furthermore, he has found that students completing the course have had an excellent driving record. As a matter of fact, of the sixty students from one class no one had a reportable accident during the entire year. Professor Neyhart along with Dr. Hoffmeister of the American Automobile Association has recently extended its work in several states by giving special training to teachers on driver efficiency.

Other methods of safety teaching used by city school teachers are:

1. Lectures by non-school people on accidents, first aid, and similar topics.

2. Safety discussion directly related to use of equipment and materials in courses in science, physical education, shop, etc.

3. Motion pictures on safety.

4. Pupil monitors or patrols for corridor, stairway, and cafeteria traffic within the school building.

5. School-boy patrols for direction of pupil traffic outside the building and on nearby streets.


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7. Library and leisure-time reading of pamphlets and booklets on safety.


9. Laboratory lessons in safety facts by excursions to factories, congested highways, and other scenes of accidents.

10. Safety, traffic and auto clubs as extracurricular organizations in school.

These methods have been enumerated according to the frequency employed but it must not be concluded that the widespread use of certain methods attaches greater importance to them. The majority of teachers are of the opinion that safety discussion directly related to use of equipment, motion pictures on safety and lectures by non-school people are most effective.

Measuring the Results

We must not assume that safety education is alone responsible for this decrease in child accidents. Safety is a joint undertaking and many agencies in the community are aiding in this work. Improved traffic regulations under the direction of state and motor vehicle departments and local police departments, better fire prevention and fire protection activities, more provisions for playgrounds and camps, better supervision of swimming places, all of these factors and many others have been valuable in preventing accidents to children.

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Needless to say that the emphasis placed upon elementary safety education has been the chief contributor to child accident prevention, outranking by far all of the rest. The secondary schools have been slower than the elementary schools in their efforts to reorganize the curriculum to meet the needs of society. On account of the hold that traditional subjects have secured in the secondary school curriculum, it has been necessary for many of the newer subjects to make their entrance through the extracurricular activities. However, by the nature of the subject matter in chemistry, general science, civics and other school subjects, safety has always had a place in the secondary schools. It is generally admitted that one of the most important reasons for studying these and other subjects is to learn of the dangers of our environment and how to prevent accidents. A recent study of thirty-eight high school textbooks on seven different subjects showed that there are a total of 305 items specifically devoted to safety. The effect of educational activities among children organized through the schools, appears to be a saving of 8,500 lives a year.

EFFECTS OF SCHOOL PATROLS—The American Automobile Association and other agencies have been fostering safety patrols for the past fifteen years. In practically all cities, police, city officials and parent-teacher organizations are cooperating with these agencies.

There are at present 100,000 patrols, recognized by their Sea Bands
belts, guarding the comings and goings of 5,000,000 school children
every day. Between 1922 and 1936, motor deaths for school children
deceased fifteen per cent, while adult deaths of the same type
increased twenty-two per cent.9

In addition to lives saved the school safety patrol has made
a favorable attack on the one time public indifference to matters of
safety. A great wave of public enthusiasm for more adequate safety
measures has been aroused. We find safety committees springing up in
many states, which are successfully helping to make the vast public
conscious of the importance of safety to the community.

EFFECTS ON CITIZENSHIP: - Besides the actual saving of lives
and the reduction of non-fatal accidents it would naturally be expected
that there are many kinds of learning that may come from safety educa-
tion. So closely is safety related to other subjects in the school
curriculum that it would naturally be expected that while pupils are
learning safety they are at the same time improving their skills in
the use of the fundamental tool subjects. Safety is also related to
good citizenship. A good citizen knows and has respect for the work
of the police, health and fire departments and cooperates with them
at work in the community.

8 Albert W. Whitney, Safety Education in Schools, New York: The
Century Company, 1932, p. 66.
Even if accidents were a necessary part of progress, a contribution of 100,000 lives, 3,000,000 injuries and $4,000,000,000 each year would be a terrible toll to pay. Accidents, as before stated, are not necessary from any point of view. On the contrary safety is correlated with efficiency, good morale and all the other conditions which characterize a good life. Accidents are only a tribute to carelessness and haste. It therefore goes without saying that safety education is of tremendous value.
CHAPTER VIII

CONCLUSIONS AND RECOMMENDATIONS

The conservation of human life, and the prevention of accident injury, is of vital importance to our welfare and happiness. While much progress has been made in accident prevention during the past two decades, particularly in the field of industry, there is still much that should be done.

—Franklin D. Roosevelt

Conclusions

1. What are present day accident trends?

A perusal of the preceding pages cannot but convince us that definite strides have been made in accident prevention. This study has been an attempt to show present day conditions as compared with previous years. The number of accidents and injuries, in every case where a definite safety program has been carried out, have decreased. Results must be encouraging when we have 11,000 people alive and happy who without the efforts of safety minded people would have lost their lives in 1938.

2. What is being done in the way of accident prevention?

After showing the trends by accident statistics, the factors influencing the decrease have been given. Due to the tremendous scope
of the subject many things affecting accident prevention have been necessarily omitted, but in every case those most important have been given. It is concluded that there are four effective points of attack: legislation, enforcement, engineering and education. Our complicated modern civilization has developed hazards more menacing than the wild beasts and human enemies of primitive man. To meet these, there are attitudes of mind, there are habits, there are techniques which cannot be adequately learned except through formal education deliberately planned and executed. Chapter VII has shown that education has definitely contributed to economic security, industrial efficiency, national prosperity, and personal happiness. It is to be expected that child education will prove to be a potent influence in decreasing accidents and improving conditions in the home - the only place where a marked decrease in accidents has not been shown. Since 1922 there have been 97,000 children's lives saved, principally through education, and shows the importance of the educational factor. Scientific method, and newer and better machines listed throughout this report have contributed much to the crusade. Where ever education and engineering have failed, legislation has been a necessary last resort.

And so in the great war to prevent accidents America is educating her people in schools and industry; she is using and enforcing drastic legislation when necessary in order to save the lives of her people. Education, engineering, legislation and enforcement are getting results.
Recommendations

We must be sure that the keystone of safety is ever more securely placed, that it does not sag or fall, but remains a firm support to the fullest realization of our ideals. Stress placed on education, legislation and enforcement, and engineering are the avenues to success.

EDUCATIONAL RECOMMENDATIONS: The exceedingly practical social and economic significance of safety objectives not only necessitates the formulation of an educational program which derives its content from every day life but also makes it imperative to teach and guide learning so that it may function automatically in every day life. The safety program should therefore consist of experiences in which safety attitudes are learned through numerous and varied approaches. It should also insure enough practice in the items of experience which are crucial to every day safety. It should organize and reorganize these specific habits and responses until they result in generalizations by means of which necessary new situations may be satisfactorily met. Furthermore, it should result in insight into the broader social significance of safety and interest in investigation and invention which contributes to safety.¹

If any program is to be efficient and effective it must have specific objectives. It is only through the process of selecting those methods which have proven best and the rejection of those which have fallen short of the intended goal that a definite general program can be formulated. The state department of education with the help of agencies that have done research in the field of safety, should prepare courses of study. State teacher-training institutions should provide for adequate training of teachers. Each city should have its own course of study in addition to the general course prepared by the state due to the fact that there are varied local problems in every community. Cities should provide materials and solicit the cooperation of local organizations interested in the field.

Industry should continue and expand its positive educational program for employees. And, finally, if the program is truly effective, all of us will be whole-heartedly engaged in doing and learning to do the following things in life:

1. Selecting safe things to do.
2. Doing things in safe ways.
3. Thinking what is safe to do.
4. Preventing others from being hurt.
5. Helping others who are hurt.
6. Thinking and planning for the safety of others.
7. Contributing to the general safety of the community.
8. Investigating and learning how situations are made safe, comfortable and convenient.
9. Investigating and learning to see how conditions may be made safe, comfortable and convenient.

We must give definite, accurate, positive instruction in the correct way of doing, because this is the sort of knowledge individuals must have if accidents are to be avoided. A positive approach will secure more far-reaching results than the supposed gruesome and repellent methods of teaching. We must be made to realize our deficiencies and if at all possible be shown the way to compensate for them.

Doubtless safety was the directing principle in the education of the primitive man, and with its implications it is a scarcely less important directing principle in our life today. And finally, it goes without saying that safety is immediately related to life, physical and social and because it is related to life it must be taught. Its educational significance grows out of the very breadth and scope of the safety concept; and its incidence in relation to the problem of living. Safety implies purpose. Safety is the condition which accompanies the realization of a purpose and teaching safety is teaching how to control the factors of an environment that a purpose may be realized. Where coordination fails an accident occurs. The result is similar, whether the forces are material or ethical.


LEGISLATION AND ENFORCEMENT:—Wherever education fails in its purpose, and it can never be 100 per cent efficient, legislation is necessary. However legislation without proper forethought is impracticable. It must have a definite purpose or it tends to detract rather than add to the program. It must be remembered that legislation without enforcement is a "shot in the air." When executives fail to notice law violators and rush to their defense very little improvement can be expected.

ENGINEERING:—Engineers are doing their part in this greatest of all crusades. They must ever be encouraged in their desire to create safer machines. Their work, however, will probably continue to be efficient due to the competition in industry and the high salaries connected with engineering efforts.

Without safety, the most important things in life are impossible of achievement. Much has been accomplished and much more can be expected for where ever engineers, educators, legislators, policemen, psychologists, government officials, citizens and organized groups have built an accident prevention machine the results have always spelled success.

An education must be had for a world in which things do not happen but are caused, an education for a world which, whether we like it or not, must be planned and in which we must take an aggressive and responsible part. Accidents have no place in such a world; for accidents are the typical product of an unplanned world. Furthermore, in such a world we cannot afford to have accidents; there is no great harm in making mistakes in a world that is beyond our control, but it is a very different matter to make mistakes in a world over which we have as much power as we have today. —Albert W. Whitney.
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