

during the past thirty years of progress—a struggle which came uncomfortably close to destroying civilization, and whose effects will still be apparent in 1962. The optimist can point to man's wonderful adaptability, in all climates and to all external conditions, and to the truth that the thoughts of man are widened with the progress of the years.

"Yet instant to fore-shadowed need
The eternal balance swings;
That winged men the Fates may breed
So soon as Fate hath wings."

(Kipling)

It is self-evident that our souls must grow with science or die by science, but no one doubts that man will meet the changing world he is making.

THE FOUNDATION OF PROGRESS

By **GEORGE M. VERITY**

Chairman, The American Rolling Mill Co.

POPULAR MECHANICS, visualizing as it does from month to month, the scientific, inventive and constructive accomplishments of the nation, helps to lay a firm foundation of Progress.

Progress must be a part and parcel of the consciousness of our people, just as much as they must be air-minded before aviation can meet the success which it deserves.

Progress itself, the mainspring of industrial activity, is simply reaching out into the seemingly impossible and carving it into fact.

Even in these days of readjustment Science is proceeding apace and Efficiency, the ultimate end of Progress, is having its greatest development.

A SOURCE OF INSPIRATION

By **R. W. SCHROEDER**

President, Sky Harbor, Inc.

I AM proud to say that when I was a boy, **Popular Mechanics** (then a weekly) was my greatest enlightenment, it fired my ambitions with knowledge of what was going on in the world and it was written in a way, as it still is, so that you could understand it.

I can say without question that my entry into aviation was a result of knowledge and ambition, fired by the constant reading of **Popular Mechanics**; which was then as it is now, the best magazine for the young as well as the older men of America.

Any small contribution which I have made to aviation can be credited to **Popular Mechanics** as having been my prime mover in this vocation.

THE GROWTH OF ELECTRICITY

By HENRY KREISINGER

Consulting Engineering Corporation

THE last twenty-five years brought a marked development in the production and the use of electrical power. In the production of power both the size and the efficiency of the units have been greatly increased. Whereas twenty-five years ago a turbo generator of 6,000 kilowatt capacity was considered an exceptionally large unit, today units of 100,000 kilowatt capacity are common. In the same period the efficiency of turbo generators has about doubled.

Twenty-five years ago the generation of a kilowatt hour on twenty pounds of steam was considered very good performance. Today a kilowatt hour is generated on ten pounds of steam. It is interesting that at an engineering conference during the Centennial Exposition in Philadelphia a boiler horsepower was defined as the generation of thirty pounds of steam, because this amount was required to produce a mechanical horsepower by the engine. At this rate of steam consumption a kilowatt hour would require about forty pounds of steam. That is, today we can generate about four times as much electrical power with a given amount of steam as was generated about fifty-five years ago.

The size and efficiency of the steam generating units as well as the working pressure have also greatly increased. Twenty-five years ago a boiler rated at 200 horsepower and generating approximately 6,000 pounds of steam per hour was considered a good size unit. The working pressure was about 100 pounds per square inch. The size of the unit has increased so that today one boiler unit generates over 1,000,000 pounds of steam per hour and is capable of supplying all the steam required for a turbo generator of 100,000 kilowatt capacity. The small boilers of twenty-five years ago were operated with an efficiency of about sixty per cent. Today the large steam generating units operate with an efficiency of eighty-five to ninety per cent. The working steam pressure has been also tremendously increased. There are a number of power plants operating with a pressure of 1,400 pounds per square inch, one plant with 1,800 pounds and one with 3,200 pounds pressure.

IDEALISM OF THE FUTURE

By DR. CALVIN W. RICE

Secretary, The American Society of Mechanical Engineers

THROUGHOUT the life of *Popular Mechanics* great technological progress has taken place. Even during the last few years of depression it has been steadily advancing.

I am confident that a distinct change for the better is taking

place in the thinking of the world and that significant improvements in many realms of engineering are to be developed. My basis for such belief is the increasing evidences of the universal creative impulse and the craving for the attainment of the satisfaction that comes in the exercise of skill. These are spiritual qualities and constitute an impressive denial of the assertion that the mechanized civilization is a menace to culture.

In the advance of civilization through the contributions of the engineer to the machine age, spiritual development has not been neglected. Materialism is not supreme; the creative impulse and the passion for excellence are still greater than the desire for gain and will be still more in evidence as time goes on.

The new George Washington bridge, with a span of 3,500 feet, or more than double the greatest span of any bridge existing four years ago, is an embodiment of the skill and creative energy of men. Those who accomplish such feats as the building of this bridge perform no less an act of service to their fellow men than did those who built the great cathedrals and are moved by the same idealism and devotion to their work.

LOOKING BACK AT 1902

By **WALTER L. UPSON**

Washington University

IT is an interesting coincidence that the life of the **Popular Mechanics** Magazine is coincident with the life history of most of the outstanding developments in engineering at the present day. If one is in a position to hark back over a period of thirty years, to the engineering of 1902, he will realize that the commonplaces of today were in the throes of birth at that time. A few examples will suffice.

In 1902 wireless telegraph signals were being transmitted from one room to the next and from one floor to another floor of the same building. The signals were detected by a newly developed instrument called the coherer.

In 1902 the first Curtis turbines were being designed and turbines of the Parsons type were only a few years older. These turbines were the forerunners of our great electric power plants of today.

In 1902 plans were being developed for the electrification of the New York Central and New York, New Haven and Hartford railroads. The former to be operated on direct current, the latter on single phase alternating current. These were at that time the great outstanding achievements in railroad electrification.

In 1902 it was nip and tuck between the electric and gasoline automobile with the steam car hovering near by. A ten horsepower gasoline car could not climb as steep a hill as a two

horsepower electric. What controversies raged over the respective merits of these competing types!

In 1902 if one were in just the right spot he might be a spectator in one of the first motion picture houses put in operation.

In 1902 artificial ice was being introduced to insure a product free from contamination for use in drinking water. This was in reality the forerunner of our modern electric refrigeration.

All of the above examples and many others could be cited to prove that modern life is in a sense thirty years old today. The past thirty years have witnessed many large developments and those who are intimately associated with the present trend have no hesitation in affirming that the coming thirty years will see an equally great advance.

KNOWLEDGE IS A NECESSITY

By JAMES W. WADE

Chief Standard Mining Company

POPULAR MECHANICS serves a dual purpose. It entertains and it stimulates the mind. I enjoy the evening I spend once a month with it; I get ideas that in some form or other, I put into use. Your magazine relates in common English, the outstanding achievements in science and their application to every day life. To appreciate the comfort, convenience and luxury with which we are surrounded, we must have a knowledge of science. The greater our knowledge, the greater our appreciation.

The increased standard of living in America can only be maintained by reducing the unit cost of output. This means the increased use of power and machines per worker. In our industry, horsepower of energy produced by man working at shoveling costs \$460 per month; the same horsepower produced electrically and applied to the work by ingenious mechanical devices costs \$6—very nearly.

The problem that confronts management in the United States is the proper division of products of labor and capital equitably, in order that labor may consume its products and that capital may be induced to accumulate and invest in industry. On the accuracy and understanding with which this is done, much of the future happiness of the American family depends.

IN THE VAN OF PROGRESS

By ROGER W. BABSON

Noted Business Statistician

WE call this a machine age; actually we are only on the threshold of inventions and discoveries which in the years ahead will further revolutionize civilization and life. The establishment of **Popular Mechanics** thirty years ago when I was

Popular Mechanics



A Corner of the Magazine's Model Workshop; This Is the Woodworking Section



Another Picture of the Workshop; the Metal Working Equipment is Shown



Students in the Workshop Learning How to Read Magazine Illustrations

Popular Mechanics

a young man just out of Massachusetts Institute of Technology was the recognition by a forward looking editor of the need and trend of the times.

It is peculiarly fitting that your magazine should be established in America which, in the years that followed, has been in the van of world mechanical progress. I congratulate you on the thirtieth anniversary of your great publication, on the courage and vision shown, and on its achievements.

Looking ahead I can see that all phases of business and finance are to be increasingly dominated by invention and discovery, provided balanced by spiritual development. The field in which **Popular Mechanics** has done so much pioneer work is one which is destined to occupy a place of increasing importance to every business man, banker, investor, and, in fact, to every member of the intelligent public.

PROGRESS NEVER STOPS

By E. H. KITTREDGE

Hornblower & Weeks

WHO can view what has been accomplished during the past thirty years in science, industry and the progress of humanity and still lack faith in what the future holds in store for those alert to the opportunities all around them. Progress knows no definite deterrent. It may seem to stand still at times but even such periods as the present, when viewed in retrospect, prove that the world moves forward with new inventions, scientific, medical and educational advancement, and though like the glacier it seems not to move, its progress is irresistible. It is not only a fair assumption, it may be said with certainty, that in the forthcoming thirty-year cycle **Popular Mechanics** will record just as many interesting accomplishments in all fields of endeavor as it has during the past. The trend of time and permanence is ever onward.

KNOWLEDGE IS POWER

By SILAS H. STRAWN

Chairman of Commerce of the United States

WE are living in an age when a knowledge of the sciences and of **mechanics** seems to be not only desirable but necessary to a successful career in any vocation. Any lawyer in general practice realizes the great advantage of even a superficial knowledge of **mechanics** and a more extensive knowledge of mechanical principles is a condition precedent to the success of a patent lawyer. The lucrative and permanent positions in almost every industry are available in these times only to those who have a well grounded technical education.

THE MAGIC OF RESEARCH

By C. L. BARDO

President, New York Shipbuilding Company

FOR thirty years **Popular Mechanics** has recorded the advancement of the machine age faithfully and well. During this time many new creative forces have entered American industry. Science and invention have become powerful allies in disclosing to humanity numberless discoveries and in devising many new applications of old principles.

Today, imagination is a sovereign quality and research has become a magic power. We have paper from corn-stalks, ice from gas, rubber from goldenrod, plant food from the air, lights that pierce fog, machines that take the place of salesmen, ships at sea in touch with the land, photographs flashed across miles of ocean, and radiograms hurled through space.

At this very moment, somewhere in our land, a patient research worker, scientist or inventor is evolving new facts, concocting strange compounds or testing some odd device that may not only lead to the development of great industries but that may at the same time ease human burdens and minister to human pleasures. American genius in industry is not wholly materialistic when properly estimated in relation to service rendered. The benefits of mechanical aid in every department of life so completely encompass us as to admit of no return to an age when these inventions were unknown.

Countless new records have been made in almost every field of invested human interest and America has attained the most advanced position ever before reached by any people. In fact we have become so accustomed to the ever increasing wonders of human triumph over the resistance of nature that we have ceased to marvel.

It is true that we are in the midst of readjustments necessitated by a war which caught the Western World in a transition stage between a nineteenth century industrial era dragging to its close, and the beginning of a new industrial age to which scientific research and invention had given birth on the American continent. It is also true that for the moment international trade is suffering from the disorganization of great areas of peoples whose consuming power has been severely injured. But this condition is temporary.

All over the world there is restlessness that may in its economic aspects be traced to the fact that many areas are desirous of becoming greater consumers of the wealth and delights of higher and more comfortable civilizations. All the eagerness for new adjustments will organize itself with a rapidity greater than it is easy to realize now and there will be as a natural and inevitable result a demand for these things which the industries and business enterprise of America can best supply. Since the beginning of the present century Pop-

ular **Mechanics** has educated us concerning this moving record of progress and achievement. It is to be congratulated on thirty years of successful effort. And as we continue to read its pages we shall expect to absorb some of the zest and enthusiasm of those who are recording the continued progress in science and invention—a progress that is a promise of prosperity.

GREATEST OPPORTUNITY AHEAD

By **WALTER KIDDE**

Walter Kidde Constructors, Incorporated

WHILE **Popular Mechanics** has taken a leading place in the advancement of civilization and industry during the past thirty years, it seems to me that its greatest opportunity lies in the years just ahead. It is my firm belief that the way back to prosperity is going to come about through development and marketing of new devices, new methods and new thinking.

We are on the threshold of a new era that has been made possible by the pause in industry created by the depression of the past two years. This temporary slowing up of the wheels of progress has given us all time and the incentive to think out new ways of doing old things. I say again that out of this will come a fresh viewpoint that will once again launch us into another, and I trust, more extended period of advancement.

I am certain that **Popular Mechanics** will, as in the past, be one of the leaders for its editorial policy of the past fits well into this policy for the future.

ACHIEVEMENTS TO COME

By **COLIN G. FINK**

Consulting Metallurgist and Research Engineer

THE year 1902 is a significant one in the American electrochemical industry. Although hydro-electric power at Niagara Falls became available in 1895, and although shortly afterward the commercial production of carborundum, calcium carbide, phosphorus and ferro-alloys was undertaken, it was not until 1902 that these and other electrochemical industries became thoroughly established and universally recognized.

Fully appreciative of the economic importance of commercially applied electrochemical and electrothermal reactions, a small group of chemists and engineers met at Philadelphia early in 1902 and founded the Electrochemical Society—an international organization which has contributed so largely to the progress and development of pure and applied electrochemistry. In that same year, 1902, the technical journal, "The Electrochemical Industry," was founded. Few of us stop to realize

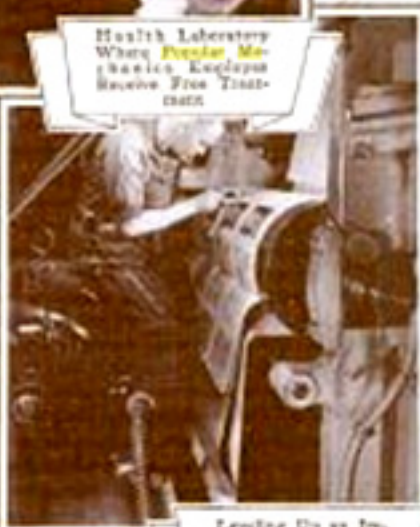
Popular Mechanics



Health Laboratory
Where **Popular Me-**
chanics Knowledge
Reveals Free Treat-
ment



Setting Up Type for
the Magazine in a
Modern Linotype Ma-
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Leading Up an Im-
pression on a Cylin-
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Rotary Presses



Examining the Ma-
chine as They Come
from the Millers in
the Bakery



Popular Mechanics

how much of our present economic structure is based upon the products of electrochemistry. The electrical industry—electric power, electric traction, electric lighting, electric communication, etc.—is, in reality, built upon electrolytic copper as a foundation. The world's production of electrolytic copper in 1902 amounted to 400,000 tons. Today it approaches 2,000,000, and by far the greater proportion of this is consumed by the electrical and automobile manufacturers.

It was thirty years ago when the first large-scale plant for the fixation of atmospheric nitrogen started operation and announced the glad tidings to the whole world that thereafter humanity was no longer dependent upon the rapidly depleting nitrate deposits of Chile as a source of nitrogen fertilizer.

Numerous electrochemical products and processes are so common today that we fail to realize that thirty years ago they were either non-existent or of comparatively little importance: The chlorine industry, many chapters could be written on that alone; carborundum, phosphorus, carbon bisulfide, electrolytic zinc, nickel and chromium, graphite, metallic sodium and calcium, ferroalloys, aluminum, magnesium and many more. Without these electrochemical products, basic industries, such as the automobile or aeroplane industries, or the vacuum tube industry, would be non-existent today.

As to the future, we often hear the remark made, "The days of the big discoveries and inventions are over. What could anybody find in the years to come comparable with the metal aluminum or with the audion?" My own belief is diametrically opposed to this. We engineers, scientists and investigators of today are in a thousand-fold better position than we were thirty years ago. We have at our command and disposal a deeper knowledge and wider experience, more elaborate tools and more sensitive instruments, numerous research laboratories with often almost unlimited facilities, and, finally, many alert and progressive corporations and industries whose directors are fully aware, as they have never been before, of the commercial importance of new and better products, or more efficient processes. And what may we expect to see by the end of another thirty years—in 1962? We marvel and glory over some of the present-day products, hardly realizing how much room for improvement there still remains. Over ninety per cent of the electrical energy required in lighting is wasted as useless heat. We build vehicles and conveyances weighing many tons to transport a few hundred pounds. We use materials for our buildings and bridges that are entirely unsuited for the specified purpose, being readily attacked by sun, air and rain. We pollute our rivers and lakes with so-called waste materials that can be converted into valuable products. Yes, we feel most optimistic as we look into the future. We firmly believe that we are at the very threshold of the greatest era in science and engineering.