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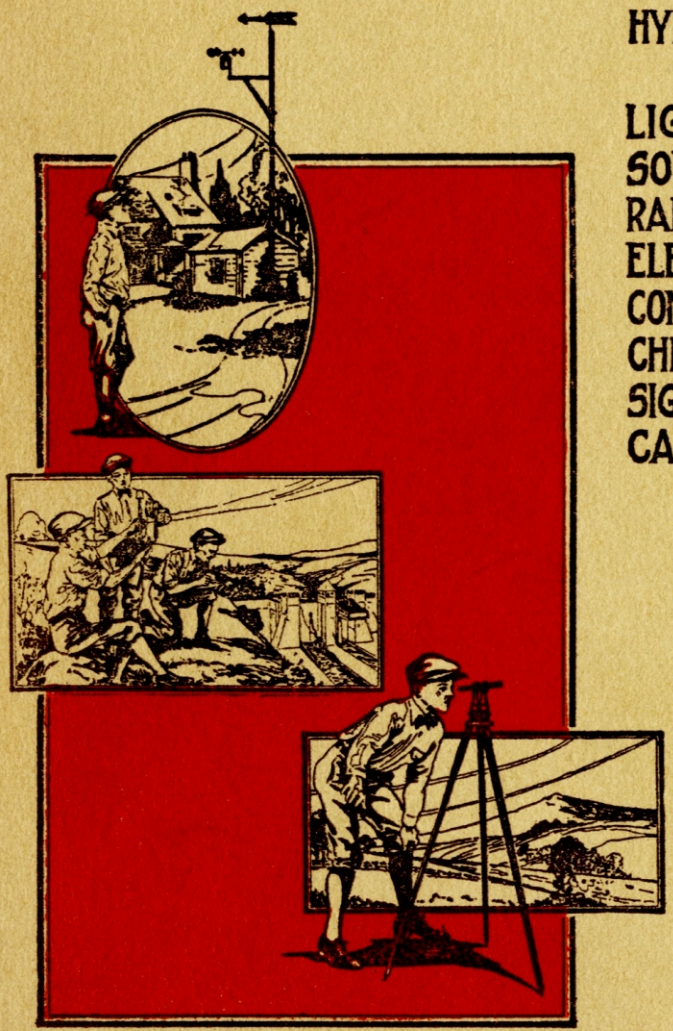
BOY ENGINEERING



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GILBERT TOYS are sold by the best toy dealers everywhere. If unable to find them in your city, write us and we will advise you where you can get them.

Prices and contents of all Gilbert Toys shown in this book are subject to change without notice.

Hello Boys! REG. U.S. PAT. OFF.

I suppose I have more boy friends in the world than any other single individual, and I am very proud of it. Every day the mail brings me letters from boys in all parts of the United States, from Maine to California, and also letters from boys in England, France, Japan, Australia, Cuba, South America, and once in a while from some boy who lives in a foreign land of which I have never heard before. Then I have to get out my old geography and study the map to find out where my boy friend lives. I have asked some men whom I know you are interested in to write articles for this book, and besides I have tried to tell you about Gilbert Toys, but before I do let me tell you something about myself, for I have had an interesting life, I can tell you.

I lived away up in the northern part of Idaho, and after I had finished my public school course, my father sent me to Pacific University at Forest Grove, Oregon, and it was there that I became interested in athletics. I did a great deal of wrestling, and one day the school entered me in the Northwest wrestling championship bouts. The first year, although I didn't win, I did very well. I went back home and trained all the harder, believing that if I persistently kept at it, I would some day win the championship. I didn't have to wait very long, for the next year the school entered me again and I succeeded in winning the Pacific Coast championship.

The same year I broke the Northwest record for pole vaulting, and was made Captain of the University Track Team. Although the school had only 150 men in it, I built up a very fine team and organized a training table just like they do at the big colleges. At this time I had no idea that some day I would go to a university like Yale. Although this was a small school, we competed with all the big colleges, and won the track championship of the Northwest. During my three years at Pacific University I took part in a great many contests and won lots of medals and prizes. I then became ambitious to go to Yale, and in 1904 I came to New Haven.

While at Yale I won the "Y" for three different branches of athletics and was presented with 160 different gold and silver medals. I also won the Wrestling Championship of the United States. In fact I was never thrown in wrestling. I was intercollegiate gymnast and won the "Y" for being the best all-round gymnast at Yale. I believe I had more success in Pole Vaulting than anything, for twice I had the world's record, having jumped over 13 feet. I was picked

out to represent America at the Olympic Games in London. During the last few days of the games I was awarded a medal by Queen Alexandria, in the presence of King Edward, as World's Champion in Pole Vaulting.

My main object in telling you this story about myself is to show you that it is the persistency with which you keep after things that counts most in making a success. I feel that every boy should be trained for leadership. It is only the bright-eyed, red-blooded boy who has learned things, done things, dared things beyond the reach of most boys who will find the way open to really big achievements. You see, boys, it is not so very long ago that I was a boy myself, and I know what boys want and the kind of toys they like. That is why, when I started to make Gilbert Toys, I made them genuine.

My toys are toys for the live-wire boy, who likes lots of fun and at the same time wants to do some of the big engineering things—things that are real—things that are genuine. Every toy I make is fully guaranteed to do just what I say it will, or I will give you your money back.

When you are in New Haven, don't forget to come and see me, and I will show you just how Gilbert Toys are made. Read through this book carefully, and don't miss the page on which I tell you about the Gilbert Engineering Institute for Boys.

Sincerely yours,

President

THE A. C. GILBERT COMPANY
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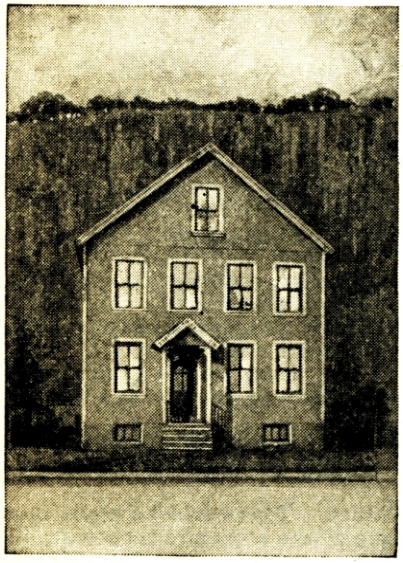
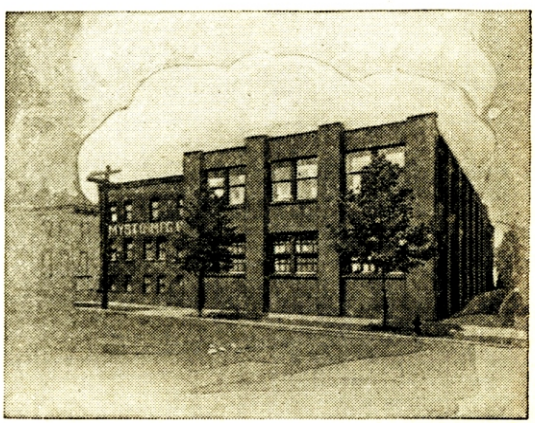
The History of Gilbert Toys



Today when I look over our plant covering many acres of floor space, and catch sight of a thousand or more employees, it seems a long time since I first started making Gilbert Toys, but, reckoned in years, it is hardly any time at all. But "much water passes over the dam in a few years." Little did I think those last few years I was in college that no sooner would I graduate when I would be striking out for myself.

Three things always interested me—Athletics, Sleight-of-Hand, and Scientific Experiments. Outside of my school work athletics claimed the major part of my time, but a good share was left to learn the secrets of magic and scientific things, the two hobbies I had ever since I was a boy. Both have been of great service to me: first, to help me earn my way through college and second, to bring science down to a boy's understanding through the scientific toys of our manufacture. The first money I ever made was by giving magic entertainments to private audiences, and while entertaining one of these audiences in this way, the thought occurred to me that if these same magic tricks I was doing could be put up so that boys would understand them easily, they would have a splendid sale. I determined to try it out. So even before I left college I had rented a small wooden building out in Westville, Connecticut, a suburb of New Haven, and started to manufacture magical apparatus on a small scale. I was my own manufacturer, shipper, and salesman, and during the holiday season I spent a great deal of time demonstrating in some of the larger cities. It was not long before Mysto Magic Sets, as they were called, were known pretty familiarly all over the country.

Manufacturing and selling just magic toys of this kind and type did not satisfy me. I had always felt that toys, besides giving a great amount of fun and enjoyment, also had a big influence on the character of a boy and that they should be considered of greater importance by parents. I realized that as a boy I always had a longing to know more about the secrets of nature and to experiment along scientific lines. So I conceived the idea of manufacturing toys of a character and kind that had been such a hobby with me as a boy—real engineering toys.



I then constructed the first models of what was to become one of the world's greatest toys—ERECTOR. These first models were crude, hand-made things that I spent many an hour working over myself. Finally the dies were completed and we started to produce the first Erector Sets. From that

day to this, Erector has been steadily growing in popularity, until it is now sold in almost every country in the world. From the very beginning boys liked it because it was something entirely different from any toy that had ever been given them—its girders were like actual, structural steel, and at that time it was the only toy operated by an electric motor.

Parents were quick to see its educational value and how their boys would benefit by playing with such a toy. While educational, at the same time is was not "school booky," and the hit it made with boys proved its value as a scientific toy.

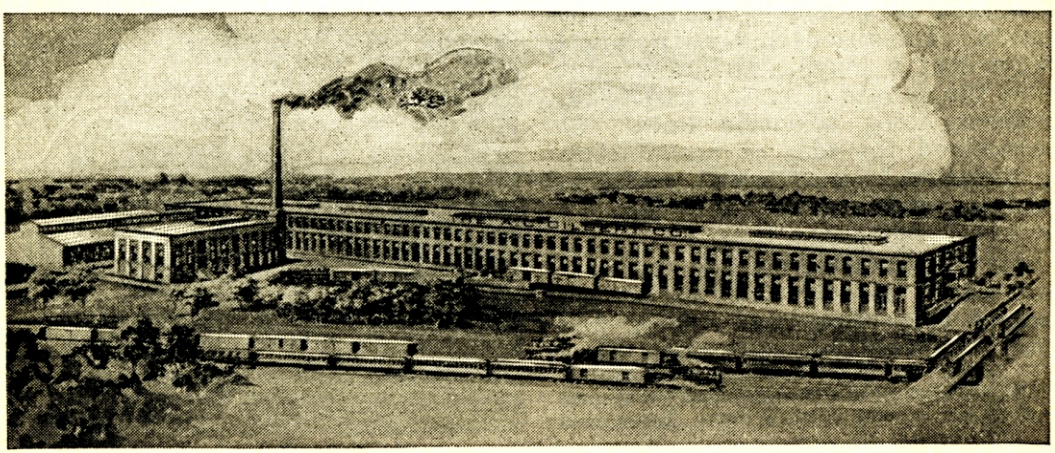
Its phenomenal success made necessary our moving into a larger plant on Foote Street, New Haven, in 1913, and its continued growth forced us to build our new plant on Fox Street, New Haven, in the early part of 1915.

My experience with Erector showed me I was on the right track. Toys could be made more than mere playthings—they could be made to mean something to the boy and his parents, and so I have continued to bring out many engineering toys of the kind and character that will hold the boy's interest because they are full of intensely interesting things and provide a great amount of fun and amusement.

As you go through this book of mine you will see illustrated the big family of Gilbert Toys that have grown up with this great, big business of ours, until it became necessary to build what they tell me is the largest toy factory in the world, covering many acres. It can be seen standing out conspicuously, with its big Wireless Tower on the main New York, New Haven and Hartford Railway going through New Haven. Its front door is always open to any of my boy friends who visit New Haven, to see the wonders of automatic machinery of every description—the kind that are turning out this great family of Gilbert Toys.

A. C. Gilbert

President.



POLE VAULTING

BY ALFRED C. GILBERT

WORLD'S CHAMPION POLE VAULTER AT OLYMPIC GAMES, LONDON, 1908

RECORDS

World's Record—New York City, 1907 .....12 ft. 3 inches
World's Record—Philadelphia, 1908 .....12 ft. 7¾ inches
Championship of the World, London, 1908 .....12 ft. 2 inches
World's Record (Unofficial), Westville, 1909 ...13 ft. 2 inches

Pole vaulting is always an interesting and fascinating event in the program of track athletics, because it is very spectacular, and combines running, jumping, and gymnastics.

The first advice I would give a boy who is going to take up Pole Vaulting would be to make up his mind that he has got to keep everlastingly at the thing, for a great deal of patience and perseverance will be required of him before he really succeeds.

The next important thing, having made up your mind, is to learn to pole vault in the proper and scientific way, for all the practice in the world will be of no avail unless you decide that you are going to learn the only correct method of pole vaulting. If you practice in a haphazard, old-fashioned way, like most boys do who are learning, you will never become a champion.

I look back to the time when I was a boy and I remember that I became very discouraged because it seemed to me that I advanced very slowly and the chances of ever becoming a champion were very obscure, to say the least. However, I had one qualification that builds for success, whether in athletics or business, and that is keeping perpetually at the thing, regardless of the many discouragements, failures, and defeats that come to the beginner.

I do not think that there is any better advice that I could give to any boy than that if he makes up his mind to do a thing, he should do it right. You will never stand for leadership unless you make it a habit to learn all the fine points of the game. It is learning all the fine points of the game that puts you ahead of the other fellow. Learn the habit of being successful, for nothing succeeds like success.

THE POLE

When I began Pole Vaulting I learned with a wooden pole; but just after I came to Yale I read of a Japanese who had made quite a record for himself using a bamboo pole. So an old teammate of mine, who is also a World's Champion Pole Vaulter, and myself, succeeded in getting hold of some bamboo poles, and we introduced the bamboo pole into American Pole Vaulting. It has been the standard ever since. My advice would be to secure from any sporting goods dealer a bamboo pole, about ten feet long. State that you want it for a boy who wishes to begin Pole Vaulting and he will, no doubt, give you a pole of the correct weight.

There is no definite or standard length to the pole. I vaulted 13 feet with a pole 12 feet, 6 inches long, although the average pole vaulter today uses a pole from 14 to 16 feet in length. However, this is not absolutely necessary, as has been proven from my own experience.

If you will study the photographs that I show you here, you will find that the body is lifted over a height far above the position of the hands on the pole. This is acquired by proper gymnastic training.

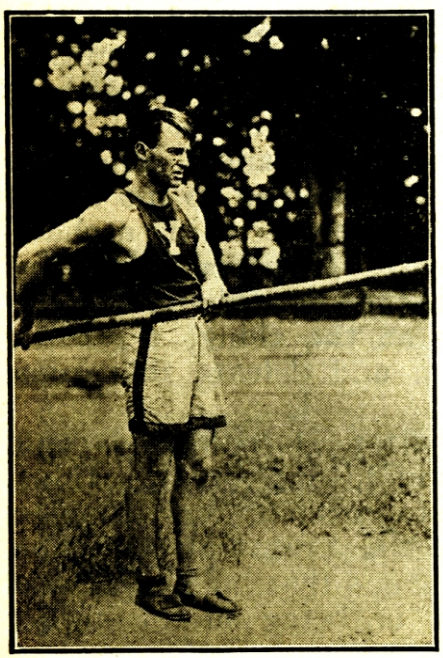


FIG. 1

POSITION OF THE HANDS ON THE POLE

Observe the position of the hands —with both thumbs pointing upward. See Cut No. 1.

POSITION OF THE POLE IN RUNNING

Note Cut No. 2. The pole is held parallel with the running path, so that the point of the pole is directly in line with the hole in the ground underneath the crossbar. You run in a straight line toward this hole with the point of the pole directly toward it; the pole parallel with the running path. This is what most pole vaulters, even some fairly successful ones, do not do; but it is very important that you

learn this method of holding the pole parallel with the path more than anything else. After a little while this becomes perfectly natural, and you would not think of doing it in any other way.

FIG. 2

THE HOLE

The hole is dug below the cross-bar, just in front—see Cut No. 3—about six inches deep at the back—the deepest part—and then gradually sloping off until it comes on a level with the running path about a foot and one-half or two feet in front of the deepest part of the hole. The object of this is so the end of the pole will slide into the hole naturally and smoothly and will keep it from slipping when the force of your body when you are running comes to position as you are ready to go off the ground.

FIG. 3

THE SLIDE

The position of the upper hand, which is the right hand, if you are right-handed, never changes on the pole, but in the act of sliding the end of the pole into the hole, just as you are doing it, the lower or left hand of a right-handed pole vaulter, is slid up the pole just beneath the grasp of the right hand. (See Cut No. 3). Important Note: Be sure to slip the hand clear up just beneath the right hand, and do it just as you are sliding the pole into the hole. Practice will teach you the importance of doing this smoothly so that there is no jerk when your

FIG. 4

body leaves the ground. This movement, of all the movements in pole vaulting, is the most difficult one to learn. To a beginner it seems awkward and impossible; and the only way to master it is to run down the runway, slip the pole into the hole and then "jump through," as we call it in practice, not trying to clear the bar until it becomes perfectly natural to slip the hand up and master this difficult movement. With a little practice it soon becomes natural, and you do it without thinking.

DISTANCE TO RUN

Different pole vaulters run different distances. The thing is to start far enough back so you can start slowly, and increase your speed gradually, so that just before placing your pole in the hole you are running at your maximum speed. It is always well to make a mark about fifty feet back of the take-off. (See Cut No. 2.) Note the scratch on the ground where my right foot is just striking in back of the mark. I have determined in practice where this mark shall be, so my take-off will always be in the same spot. This saves changing the length of your stride in order to take off at the right spot.

Now trot up to the mark and then run at your top speed, which brings you to the take-off with the right foot just at the right spot. This also requires practice; and it is necessary to run through a few times until you find the right mark to start from. After you once find the right mark, you should measure it so you will always have it when you go out again to jump. You will sometimes find it necessary to move the mark forward or backward, depending upon different conditions. If there is a strong wind your stride will not be as long, or sometimes you feel more brisk and your stride is more lively. You must make allowances for these differences. This will all be determined with practice, and you will soon know whether you are getting too close to the hole or too far away.

SHOVING THE HANDS UP IN THE AIR

Now note Cut No. 3, and especially notice how the arms are high up in the air—that is, straight from the shoulders. It is very important that you should have the pole up as high as you possibly can reach and keep the arms straight. WARNING: Do not bend them. Keep the pole high up and in this position even after you have left the ground, for if you study Cut No. 3 carefully you will find that my arms are straight and the pole is straight over my head, even after I have left the ground a fraction of a second.

Now it is not necessary to jump as you leave the ground. You simply run off the ground. This may be a surprise to you, as most pole vaulters think of jumping. Jumping will make your movements unnatural and jerky. A smooth pole vaulter simply runs off the ground and the pole itself carries him up and over with the momentum of his weight behind it.

THE PULL

After you have left the ground, start pulling on the pole with both arms. Note Cut No. 5. It is very important that you do not pull too quickly. You will find, if you followed the photographs carefully, that I always face the bar squarely. I do not start to turn or pull until I am well up in the air, and this is where the gymnastic part comes in. It is for this reason that I advise you to do a good deal of gymnastic work in the gymnasium, so you can execute the rest of the movements easily.

Now with the momentum of the run you are able to pull yourself up with ease. Note Cut No. 5, where I have just started to pull. I have not yet started to turn the body around.

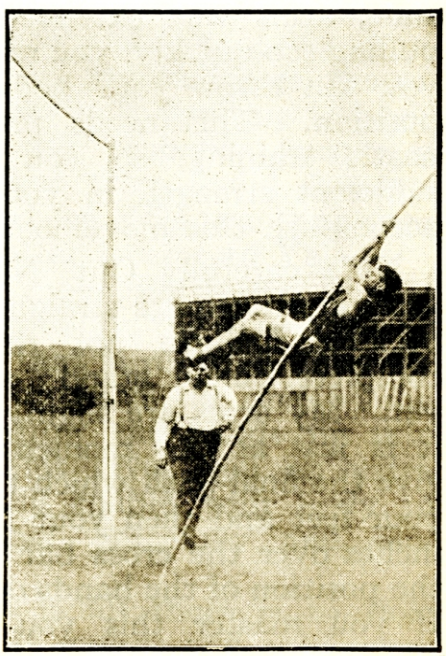


FIG. 5

THE TURN

Now examine Cut No. 6, where the body is just beginning to turn. As I said before, you do not turn the

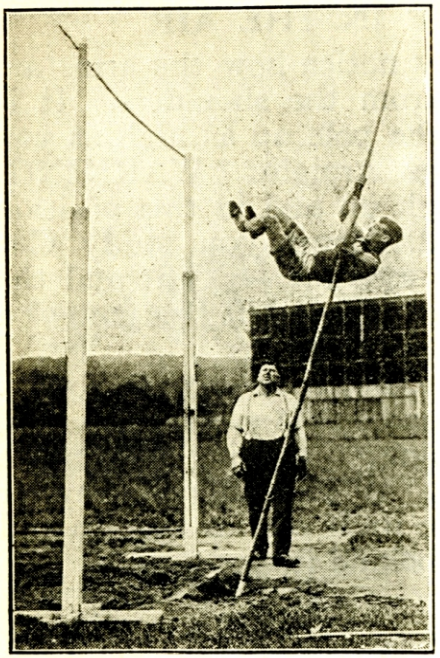


FIG. 6

body until you are well up in the air. The whole movement, until you have cleared the bar, is all executed in a few seconds; at the same time, these movements are difficult and separate. They are well illustrated by the different photographs. The turn consists in putting your body in the position of what is known as the "hand stand" in gymnastics. This is accomplished by pulling up with hands and turning the body around, and is well illustrated in Cuts Nos. 6 and 7; Cut No. 8 shows the body completely turned around in the position of a hand stand. You will find it impossible to accomplish this unless you have made a smooth, clean get-away from the ground without any jerk. With the proper momentum—that is, a fast run—a smooth slide, arms well extended, and not pulling too quickly, you will find that you can throw your body into this position. This needs proper gymnastic training, so you will have sufficient strength in your arms to accomplish this movement.

Note carefully Cut. No. 8. My arms are not quite straight. That is because I have not reached the complete "hand stand" position as yet. My arms are slightly bent, for it is just at this moment that you give the final push which throws first your feet and then your body many inches over the cross bar high above the position of the hands on the pole. If you master this you have the real secret of success in pole vault-

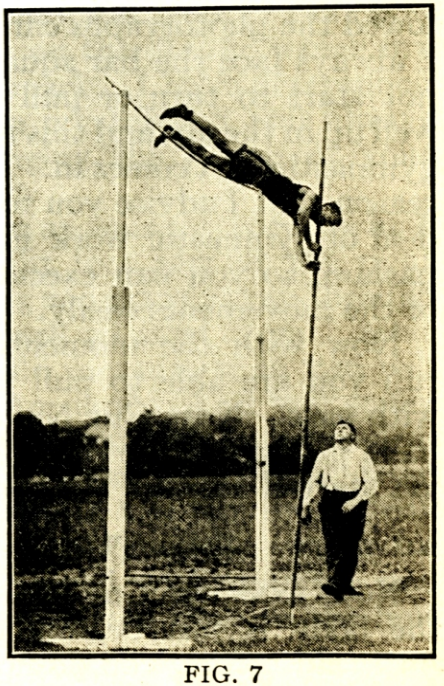


FIG. 7

ing great heights, that is, the ability to lift your body well above the position of the hands on the pole.

When I broke the World's Championship in Philadelphia in 1908 in a tryout to see who would represent America in the Olympic games at London, I cleared the bar at 12 feet, $7\frac{3}{4}$ inches, and my pole was only 12 feet, 6 inches in length, so that the pole actually dropped under the crossbar before I had cleared it. You can see how high above my hands my body was in going over the bar; and this depends, or is the result, of that little shove or push up just before letting go of the pole.

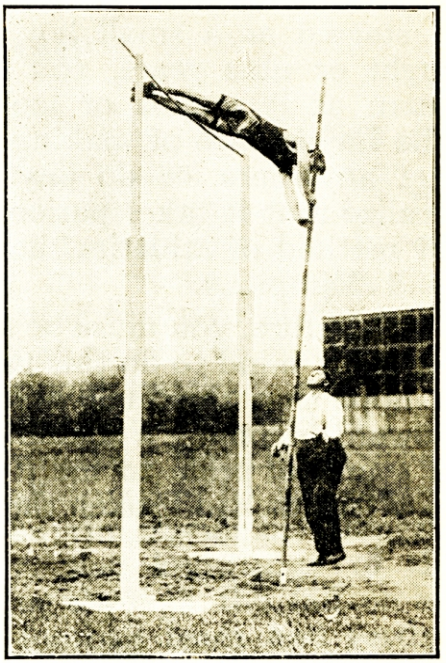


FIG. 8

This is the last word in scientific pole vaulting, and will not be acquired until after many long weeks—yes, months—of constant practice, with patience and perseverance. But with this knowledge of the secret of proper pole vaulting to begin with, you will probably master it much quicker than I did, because this method of pole vaulting was developed after I came to Yale.

FIG. 9

The last move, illustrated in Cut No. 9, is, probably, the easiest of any because all that is required after the push up is to leave the pole behind you and throw the hands up into the air. This gives you an extra lift that will enable your body to clear the bar gracefully and successfully.

Now this is all there is to Pole Vaulting. It sounds and reads very smoothly, but when I tell you that

I started as a small boy and kept at it perseveringly for some eight or nine years, you can imagine that it is not so easy to learn as it sounds or looks. That is why I keep talking about the importance of making up your mind that if you are going to get anywhere, or do anything successfully, you especially must realize that it takes patience and perseverance to master any form or method of athletics that will put you in the top row of leaders and champions.

Therefore, you must be a red-blooded boy, and unless you make up your mind to do this thing thoroughly, there is no use starting. I hope that this little description will start some boy on his way toward becoming a champion pole vaulter; and it would, truly, be a source of pride to me if I could sometime read that one of my boy friends had broken the world's record.

A. C. Gilbert

President.

HOW TO BECOME A FOOTBALL STAR

By WALTER CAMP

In these days of keen competition for positions on football teams, preparation is the thing that counts enormously. By preparation I do not mean just a little preliminary training, but weeks, months, and even years of getting ready to do the work well. That is what makes the great league player in professional baseball, and it is coming to be more and more a necessity for any boy who is to make a first-class football team. It is not all drudgery by any means. All the time that he is improving his strength, physique, agility, and knowledge of the game, he is playing through the fall on his scrub or school football team and getting a lot of fun out of it. The point I wish, however, to emphasize, is this: that he can, at the same time that he is having his fun in the practice and in the contests, be making himself better and better until by the time he is twenty he may be a real star. The way to do this is for every boy to study first how to put himself into first-class physical condition, and then how to keep in trim and at the same time steadily improve his physical strength, suppleness, and endurance. Good health is the basis of it all. You cannot build without that foundation. One of the most promising half-backs on one of the best 'varsity teams, a few years ago, was forced to abandon the game in mid-season because a medical examination showed that for a long time he had not been in good health. Here was a man who had all the qualifications except that one foundation, and yet on the very eve of the time when he should have blossomed out as a star, he was obliged to give up the game. All the rest is supplemental to and should help in the continuance of this good health.

A man's endurance comes quite largely from the condition of his heart and lungs; just as when you see a player with a good deep chest you feel a confidence in his power because he has room for his heart and lungs. No man should be all knotted up with

over-developed muscles, for then he is muscle-bound and slow. You don't need great masses of muscle to make a football player. You need strength, but suppleness and quickness also, and a slow "ice wagon," as the boys call him, finds himself beaten in the competition by a smaller but more efficient man. Speed is a great essential for backfield men and ends, and power, agility, and endurance for the line men. The way to develop these attributes is to build them up in the boy just as young as possible. Twisting and turning motions of the body promote suppleness and control. Exercises to lift up and deepen the chest improve the lungs and help the heart and gradually create a condition from which endurance is developed through hard, vigorous play.

The three essentials in training are exercise, diet, and sleep. As for the latter, no man in training should have less than eight or nine hours' sleep, and if he is under sixteen or seventeen, then nine or ten hours is required and should be insisted upon. As to diet, training is now far more liberal than it used to be, and a man or boy can eat almost any wholesome food and some sweets, if taken at the end of a meal. If at all troubled with constipation, he should take food that will help this tendency. The old-fashioned, hard restrictions to rare meat and little liquid are antiquated. He should drink seven or eight glasses of water daily and very little of it at meals—just sipping then—but when the stomach is empty taking good draughts of cold, not iced, water.

Now as to the most interesting phase—the exercise. His practice on the field and in scrimmage will give him plenty of good, vigorous action, but as a boy is building up to be a really great player, he can supplement this both during the season, and especially at off seasons—spring, summer and winter, with special exercises. Swimming is good; so are baseball and tennis. Basket ball, if played outdoors, is fine, but indoors and in poorly-ventilated gymnasiums, is of very doubtful value. Wrestling and boxing are both excellent, but plenty of fresh air and ventilation is required if the building-up process is to be effective. Now as to suppling and strengthening exercises; here are four that operate directly in favor of helping a football player to acquire the kind of physique most desirable.

First, the Duck Walk. In this, a man squats down by bending his knees until his hips are as near his heels as possible. Then, lifting up only a very little, and keeping the back practically straight, he walks in this position, or rather waddles, for it is from

this waddling characteristic that it has its name—the Duck Walk. All big linemen should be made to do this, and it is worth while for the whole team to do it. At first it will be enough to do it only twenty yards, but after a time the team should be made to go half the length of the field on it. It will be found that under this discipline, big line men, who at first contend that they cannot get down low in the line on account of their formation, are able to get down until they are almost resting on their heels.

The second exercise, one for suppling the body and making transverse muscles strong, is to stand in an erect position. Put the hands up straight over the head and clasp the fingers together then bring the arms against the ears, describing a two-foot circle with the hands, the body being kept straight and pivoting at the waist. This is an excellent exercise for every man on the team, and has a particular effect, not only in strengthening the muscles, but in making the body supple; it is also an excellent preventive of constipation.

The third exercise is to stand with arms extended horizontally from the body with the feet about twelve inches apart; then turning at the waist, place the right hand on the ground, midway between the two feet, letting the left hand and arm point straight up in the air. Then come up to an erect position and reverse, putting the left hand down. When the right hand goes down, the right knee is bent, and when the left hand goes down, the left knee is bent.

These last two exercises, taken in conjunction with the Duck Walk, which strengthens the thighs, will help very materially.

Fourth, halfbacks and men who are to throw the forward pass will find another exercise advisable, in that it strengthens the grip. It can be done any time of the day, off the field or in a man's room. Taking a small rubber ball in the hand, squeeze this ball repeatedly; then open and stretch the hand twenty or thirty times. Take the ball and squeeze it again ten or a dozen times. Then taking the ball between the ends of the fingers and the thumb, squeeze it a dozen times in this position. This gives a much better grip of the football in throwing it.

Finally, an excellent thing to do is to hold a football in the fingers while sitting in your room, reading or studying. Hold it by the end with the finger tips until tired. Repeat this frequently and the grip will improve remarkably. Lastly, don't tire yourself, but rather try to acquire as much added vitality as you can.

Hello Boys! REG. U.S. PAT. OFF.

You've heard of Capt. Eddie Rickenbacker, America's Ace of Aces. The man who went to France to drive General Pershing's automobile and came back the greatest flyer America produced. You heard a lot about him during the war and since then, but how many of you knew he was the idol of the automobile racing world at the moment America entered the war. As soon as he heard that he came to America, for he was in England building a new racing car, and endeavored to enlist all his friends in the automobile racing world in a squadron of Air Fighters. However, this was impossible, as he soon found out so he determined to strike out by himself.

He suddenly accepted General Pershing's invitation to sail with him the next day and became the driver of the general's automobile at the front, where he wisely foresaw he would find a quicker opportunity for entering the flying service.

In eighteen months he returned, the American Ace of Aces.

Boys, Capt. Eddie Rickenbacker was a regular fellow. I'll bet when he was a boy he was one of the livest in his crowd. He was a real boy. The kind I want every Gilbert boy to be. I've asked him to write for you his first experience over the German lines for I know you'll enjoy it, and what he has written, boys, carries one of the biggest kinds of messages to you. It shows what a man can do if he has confidence in himself and the courage to stick to a task, no matter how hard. We can't all become Aces, boys, but a good many of you can become big men in other ways by following Capt. Eddie Rickenbacker's example.

Sincerely yours,

A. C. Gilbert

President.

My First Flying Over the German Lines

By

CAPT. EDDIE RICKENBACKER

After days of schooling and nights of anticipation, I woke up one morning to find my dreams come true. Major Raoul Lufbery, the most famous of our American flyers, and the commanding officer of our group, announced that a flight would take off after breakfast for a look at the war across the German lines. He himself was to lead the flight. The patrol was to be over enemy territory in the Champagne sector.

"Who is to go?" was the thought in every pilot's mind, as we all stood by in more or less unconcealed eagerness. None of us had as yet caught a glimpse of our future arenas. We all had vague ideas of the several kinds of surprises in store for us over Hun lines, and every one of us was keen to get into it.

Major Lufbery looked us over without saying much. Luf was very quiet in manner and very droll when he wanted to be. He had seen almost four years of service with the French Air Service and in the Lafayette Escadrille, and had shot down seventeen Hun aeroplanes before the American Air Service began active work at the front. Every one of us idolized Lufbery.

"Rick," said the Major casually, "you and Campbell be ready to leave at 8.15."

I tried to appear nonchalant as I replied, "Yes, sir."

Douglas Campbell put up a much better face than I did. The other boys crowded around us and presented us with good advice, such as "Look out for Archy, mind," and one thoughtful fellow kindly cautioned me to crash in our lines if the Huns got me, so that he could personally put a cross over my grave.

That memorable morning was the 6th day of March, 1918. I had joined the Hat-in-the-Ring Squadron just two days before at

Villeneuve. We were then some twenty miles behind the lines and were well installed on an old aerodrome that had been used previously by several French Aero Squadrons. This expedition was to be the first essay over the lines by a "Made-in-America" Squadron.

Sharp upon eight o'clock, when Major Lufbery entered the hangar, he found us ready for him. It takes about ten seconds to step into your Teddy-bear suit, slip a flying helmet over your head, and snap on the glasses. Campbell and I climbed into our Nieuports. The Major gave a few instructions to Lieutenant Campbell, then came over to me. I felt like a man in the chair when the dentist approaches. Of course I listened politely to his parting words, but the only thing that appealed to me in his discourse was the order to stick close to him and keep formation. He did not have to repeat that order. Never before did I realize how seductively cold death beckons a pilot toward his first trip over enemy lines.

Lufbery ran his motor for a moment, then took off. Campbell followed upon his heels, and then I opened my throttle. I cast a last, longing glance at the familiar flying field as I felt my tail go up, the wheels began to skim the ground, and with the wind in my teeth I pulled her up and headed after Campbell.

Just when I had gained enough equilibrium of mind to keep my place in formation and at the same time take an interest in the battlefields below me, I began to feel a terrible realization that seasickness had overcome me. I didn't want to confess even to myself that I could get sick in the air. This was what would be expected from a brand new aviator on his first trip over the lines. It would be wonderfully amusing to Lufbery and the rest of the boys in the Squadron when I got back to the field—if I ever did—to advise me to take along a bottle of medicine next time I tried to fly. I grew cold with the thought of it. Then I set my teeth and prayed that I might fight it off. I determined to look straight ahead and to concentrate my whole mind on the task of sticking it out, no matter how I felt.

I had hardly got control of myself when I was horribly startled by an explosion which seemed only a few feet in my rear. The same instant the concussion caught my plane and I began to roll and toss much worse than I had ever realized was possible. The very terror of my situation drove away all thoughts of sickness. In the midst of it several more shocks tipped my machine and

repeated sounds of nearby explosions smote my ears. All that I could see were four or five black puffs of smoke some distance behind and below my tail.

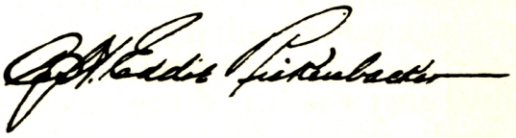
I knew what they were right enough. They were "Archy!" They were eighteen-pound shells of shrapnel which were being fired at me by the Germans. And probably they had quite a few more of those shells on hand which they contemplated popping up at me.

I shall never forget how scared I was and how enraged I felt at the old pilots at home, who pretended to like the Archies. Little by little my alarm passed away. I began to watch the course of the black puffs behind me. I grew accustomed to the momentary disturbance of the air after each explosion, and almost mechanically I met the lift of the machine with the gentle pressure of my joystick, which righted my Nieuport and smoothed its course. And a rush of happiness came over me with the assurance that I was neither going to be sick nor was I any longer in any terror of the bursting shells. By Jove, I had passed through the ordeal! A feeling of elation possessed me as I realized that my long-dreamed and long-dreaded novitiate was over. At last I knew clear down deep in my own heart that I was all right. I could fly! I could go over enemy lines like the other boys who had seemed so wonderful to me! I forgot entirely my recent fear and terror. Only a deep feeling of satisfaction and gratitude remained that warned me and delighted me, for not until that moment had I dared to hope that I possessed all the requisite characteristics for a successful war pilot. Though I had feared no enemy, yet I had feared that I myself might be lacking. With the sudden banishment of that first mortal fear that had so possessed me came the belief in my own powers that knew no bounds. I loved flying. I had been familiar with motors all my life. Sports of every sort had always appealed to me. The excitement of automobile racing did not compare with what I knew must come with aeroplane fighting in France. The pleasure of shooting down another man was no more attractive to me than the chance of being shot down myself. The whole business of war was ugly to me. But the thought of pitting my experience and confidence against that of German aviators and beating them at their own boasted prowess in air combats had fascinated me.

So it was that each experience that came to me in those first days

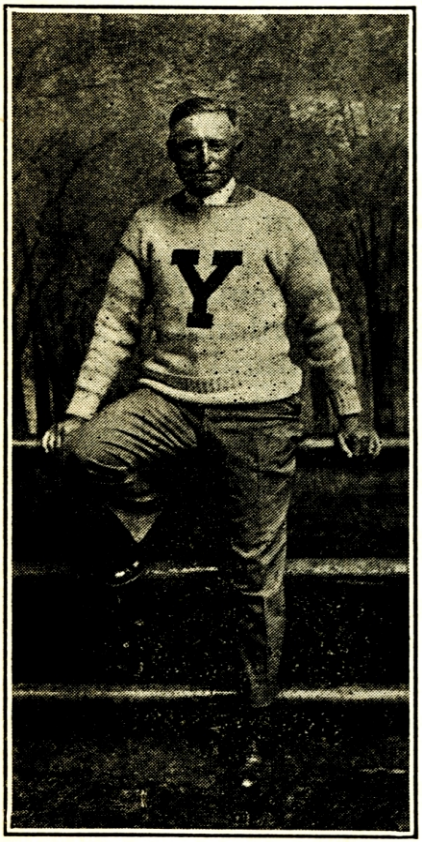
of war flying made a great impression on my mind. I grew more confident each day. Many doubts were removed, more disdain for the enemy came to me, and a growing certainty gradually possessed me that I had fathomed all the possibilities that could threaten me and my aeroplane when over the lines of the enemy. And I always tried to remember every incident that happened, so that in the future I might take advantage of familiar circumstances.

So I say to you, boys, profit by your experiences. Gain from them the things that build your mind and body.



HOW A BOY SHOULD TRAIN TO BECOME A CHAMPION ATHLETE

By JOHNNY MACK
Athletic Trainer, Yale University



It has been my responsibility to instruct, train, and develop many athletes, and I want to say right in the beginning that the greatest disadvantage, by far the greatest obstacle I have had to contend with in trying to develop champion athletes, is to correct old styles, wrong methods and poor form acquired before coming to college—acquired by young boys who have been taught wrong in the beginning, or who have never had any athletic instruction at all, and have tried to learn by their own methods.

The best advice I can give any boy, if he is at all interested in any branch of athletics, is to learn the correct way in the beginning, and then he will not have to unlearn things afterward. You, no doubt, are familiar with the expression commonly used among good athletes—"good form."

Good Form. Ninety-nine out of a hundred times it is safe to say that it makes no difference how wonderful your physical development may be—or how naturally athletics may come to you—if, in your respective athletic event, you have not acquired good form or correct methods, the chances are pretty limited for your ever becoming a champion athlete. Therefore, the first essential is to get someone who knows how to teach you, or read and study from authoritative books to assure yourself of a right start in the right direction, so that you will not begin by acquiring bad form which takes months, yes years, to correct.

DON'T THINK YOU HAVE TO BE A NATURAL ATHLETE

There seems to be a pretty general opinion among most people that athletes are born and not made. Nothing could be further from the truth. I have had occasion to study the life history of some of the world's greatest athletes, and I want to tell you, boys, that it has not been the natural qualifications or the natural physical development that has made the best athletes nearly so much as the one essential which, to my opinion, is the most important thing in becoming a champion athlete. That one essential is—everlastingly keeping at it with perseverance, determination, and courage. I feel perfectly safe in saying that if any young man will start off with a firm determination that he will keep everlastingly at it, and will not let anything discourage him, he will, in time, make a success of whatever branch of athletics he goes in for. This sort of determination, stick-to-it-iveness supplemented with proper instruction in the beginning, will go further toward making a champion athlete out of a young man than all the natural qualifications he may have inherited.

The thing to do, if you are going to go into anything, is to make up your mind early in life that you are going at the thing with the idea to win.

THE "NEVER DIE" SPIRIT

If you go at it in this spirit—even though you do not become a champion athlete in the end—you will be well repaid, for this is a character-building qualification that will be helpful when you go out into the world to do other big things.

DON'T GET THE "BIG HEAD"

If you have gone into athletics determined to make a success of it, and are beginning to show results that make you pretty well satisfied with your work, don't let it turn your head. As they say in athletics, don't get the "big head." The associations you form in athletics will mean more to you in after life than, as a boy, you possibly can imagine. This is one of the greatest opportunities that athletics offers young men, for in all branches of athletics you will find red-blooded men—the men who do things in after life, who have developed that character of going about things that stands for leadership. You will deprive yourself of

many of the best things in life if you fail to win the friendship of your associates, or make them despise you by boasting about yourself. Let the results you accomplish speak for themselves.

BE A GOOD LOSER

In order to do this, it means you must be a good loser. Put all you have into the game and go in with the spirit to win. Fight with that determination that stands for leadership and success. Do not belittle yourself and do not lose the admiration of friends who respect you for qualities of determination and stick-to-it-iveness. Be a good loser when you are beaten; always congratulate the winner, thereby developing personality that will mean more to you than all the success you will gain by achievement.

SCHOLASTIC STANDING

I have seen many young boys enter college with prospects of becoming champions; prospects of winning their way to leadership. But they neglected their school work and lost the opportunity. The requirements today in schools, colleges, and universities are such that no athlete can afford to neglect his studies. Therefore, you must make up your mind that you want to make a good record for yourself in your class as well as on the athletic field, and remember always that there are two parts to education—the part you get inside in the class room, and the part that you get outside, from your association with the fellows. They are both important and you cannot neglect one at the expense of the other.

Far too many young men do not take this phase of athletics seriously enough. They do not seem to realize that they will not be permitted to compete in athletics unless they are up to standard in their studies; and the foundation you make in the preparatory school will make it all the easier for you when you get into the big university. Therefore, do not enter college with a handicap that may keep you from becoming a success.

PHYSICAL REQUIREMENTS

There are really no set physical requirements for an athlete. What one expert may say about proper development, size, and so forth, may all be thrown to the wind by some little shaver coming along

and breaking all preceding records. However, there is no doubt that the big man is apt to be more qualified as a hammer thrower, or shot putter, or football player, than a small man.

The main thing I want to impress upon you is that it does not make any difference whether you think you are too small, or light, or weak, or that some of your good friends will laugh at you when you go in for athletics. Just forget all this and have the right kind of stuff in you. The physical requirements that appear to you to be lacking, will gradually develop, and with the right kind of determination you will find that these hindrances amount to nothing. You will soon overcome them and make yourself worth while.

PHYSICAL EXAMINATION

In most big institutions you are not permitted to go into athletics unless you have had an examination by a physician. It is just as important as any other factor that young men who enter into athletics should know what their physical condition is. For this reason a physical examination is imperative. It is too often neglected by young men. The importance of it cannot be overestimated, because there may be some little physical defect that can be easily overcome with proper instructions in the beginning.

You sometimes hear people talk about athletics hurting a young man. The only time that athletics hurt a young man is when he takes them up while he has some physical defect of which he was not aware. As a general rule this physical defect could have been easily remedied with the proper care or instruction. Therefore, take my advice and find out about these things in the beginning.

COMPETITIVE ATHLETICS

A man without nerve, determination, or courage can exercise in a gymnasium and enjoy the benefits of training, but the joy of competition will never belong to him.

I think it, however, a great misfortune that young boys in preparatory schools are thrown into competitive athletics when too young. By this I do not mean that a reasonable amount of competition is not good for the young man. It is ofttimes the case that boys will go into a great number of events to help out their school in championship meets. This is too much of a tax upon the strength

of the boy who hopes some day to be a great athlete. He should conserve his strength in youth so that when he comes to the peak of his training, during those days when he goes to college, he will have a big reserve of energy in order to do those big things that make world champions out of men.

My sole object in writing this paragraph is to impress upon you that you should not try to go into too many things or do too many things when you are in preparatory school. The thing to remember, then, is that the future is still in front of you, and the great big things in life and the things that are going to mean most to you, are the things that you will do in the college or university. I know that it is a hard thing for a boy to hold himself in check when he is anxious to help his school in every way; but not to do so will be a great misfortune, one that he will regret later when he is called upon to do the most that is in him for his university. He will find then that he has outdone himself too early in life.

AT WHAT AGE SHOULD A BOY BEGIN

There is no set age when a boy should take up athletics. I would say the best time is when he has made up his mind that he wants to go into training; but, as I said in the beginning, when he does make up his mind that he wants to go into them, he must learn how to go about it right. However, at whatever age he enters, the main thing is not to overtax himself too much in the beginning. He should work up gradually. Never let anybody put you to a task which is beyond your power to accomplish, or that taxes you too much in the early years of your life. Start early if you want to, but go about it systematically.

PROPER TRAINING

A very silly idea prevails in the minds of most people about the proper method of training. It is an old-fashioned idea that an athlete should make great sacrifices regarding his diet. Special dieting does not hold the important position it once held in athletics. Modern trainers have assumed the common sense idea that the essential thing is to eat good food, properly masticate it, live a natural, healthy life, and you will be following the proper course that an athlete should follow. This does not mean that you have to deprive yourself of a reasonable amount of good things, like pies

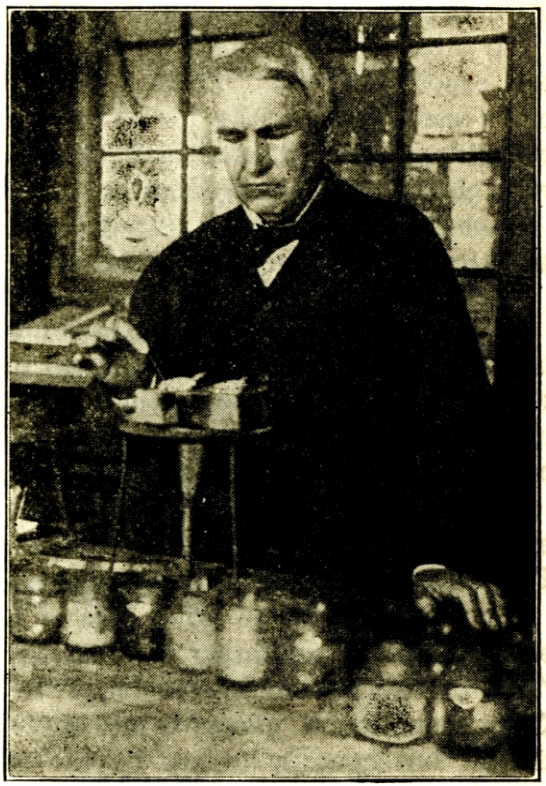
and cake, that most boys are fond of. Smoking is one thing that every boy must make up his mind not to do. Live a good, vigorous, healthy outdoor life, with regular hours of sleep, and see that your room is well ventilated with fresh air. The very best sort of thing that a young man can do is to develop the habit when rising to go through some simple calisthenics that will invigorate him, and follow them with a good rub.

All that I have said may be summed up in a very few words, but they mean success or failure in athletics.

1. Determination to keep everlastingly at it and never become discouraged.
2. Avoid forming bad habits in the beginning, by getting competent instructions.
3. Don't think your natural physical make-up is a handicap to your becoming a successful athlete.
4. Common sense, plain, healthy living.
5. Remember you must keep up in your studies.
6. Be sure to get a physical examination before you go into athletics.
7. Don't forget your exercises in the morning, with a cold shower and a good rub. It only requires a few minutes, but it will mean much to you in later life.

AN INTERVIEW WITH
THOMAS A. EDISON

In answer to a question as to what he thought was the World's greatest need, Mr. Edison said:



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"We are living in the age of the world's greatest discoveries and inventions, but it should be of great interest to know that many great problems and many great inventions and discoveries are yet in store for us. This means there are great possibilities ahead for the inventors of the future. In all the recent great discoveries and inventions, there is plenty of room for perfection and improvement. The great question of food production, soil fertilization, automatic machinery of every description and kind are problems in their mere infancy, and they hold in store great possibilities for the inventors and scientific men who will perfect and work out the things that are of such great importance to the whole civilized world.

"These facts may start many boys on the way to thought and experiment through which many new discoveries and inventions may enrich future generations.

"The boys of today will be the inventors of tomorrow, and the achievements of some of them will probably startle the world. When I see the opportunities for studying and experimenting that are open to boys of today I think of my earlier days and wish that I might have had the advantages now existing. But, I realize that the boys of every age have advantages over the boys of the previous one and that the world progresses through experiences and discoveries of preceding generations.

"If I have any advice to give to young boys, I should say, first of all train your mind. Take an interest in everything. Do not neglect your school work; play hard when you play and work hard when you work. Reason things out for yourself. Things come easier for boys now than they did when I was a boy,

and many are apt to drift along and not train themselves for the big things in life. They do not take things seriously enough for the success of their own future. Nothing breeds success like success—cultivate it. Start in succeeding; be serious; learn things that other boys do not know.

"If a boy is at all interested in electricity by all means let him begin to study and experiment now. There is no science that is more interesting—none that offers such opportunities for progress and profit. The skilled electrical worker will always be in demand and the boy or man who combines creative ability with electrical knowledge can go very far on the road to success.

"Let the American boy of today train himself so he will stand for leadership and the big achievements of the future."

I have asked Mr. Edison to say a few words for my book on Boy Engineering, believing it will be an inspiration to boys who are interested in learning about scientific things. His leadership and achievements are an inspiration to all red-blooded boys and I have asked him to give his opinion as to what the future holds in store for the boy who trains himself to become a Scientist.

Thomas Alva Edison, as we all know, is truly a great Inventor. His achievements are an inspiration to everyone. His inventions did not merely happen. The result was the thing that held his interest as much as the reason for it.

In introducing "The Boy's Life of Edison," an interesting and authoritative book published by Harper & Bros., Mr. Meadowcraft, Edison's assistant, says: "It is probably as an Interpreter of the Secrets of Nature, that Edison fascinates the imagination of almost every boy. His greatness has not been reached by chance, but honestly earned by the hardest kind of hard work and the most intense and earnest application."

It can certainly be said of Mr. Edison that he belongs to the electrical age, and is the Master Experimenter. I earnestly believe that Mr. Edison's words will lead many boys toward some of the great achievements of the future.

A. C. Gilbert

President

GENERAL THEORY OF
WIRELESS TELEGRAPHY

BY CLARENCE D. TUSKA
Associate I. R. E. Former Editor *O. S. T. Magazine*

In 1901, when Marconi first succeeded in transmitting signals across the Atlantic from Poldhu, Cornwall, to St. John's, Newfoundland, a great wave of enthusiasm spread over this country for the new-found science of wireless telegraphy. Wireless was no longer a dream, but an actual, practical method of telegraphing without wires. Not long after the results of the first work were heard of, amateur wireless sprang up in the United States. From that time to this, the amateur operators have grown in number and knowledge. The amateurs of the United States lead every other country. The amount of their knowledge is surprising, and it is hoped they will always lead.

WIRELESS WAVES

The theory of wireless telegraphy may be best understood by referring to an electrical condenser. From your work with the Gilbert Electrical Set you are probably already acquainted with condensers. Still, it is possible that you have forgotten about them, and in this case Figure No. 1 illustrates a simple condenser. The condenser consists of two parts: the metal plates or conductors, and the insulating material which separates them. The separating material is always an insulator, called the dielectric. If we connect the condenser plates to a battery or any source of electricity, energy can be stored in the dielectric.

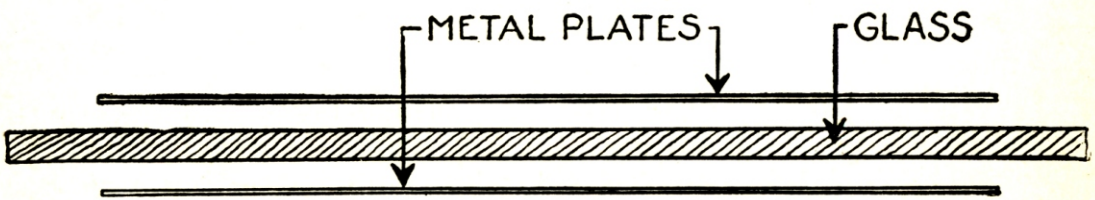


Fig. 1

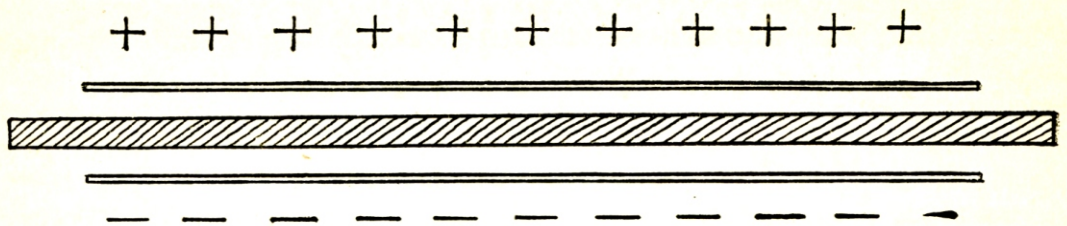


Fig. 2

Now let us see how the electrical energy is stored up. Fig. 2 shows two plates which have been charged with electricity. On one plate a certain number of positive charges have been placed, and on the other an equal amount of negative charges. The positive and negative attract each other. The attraction between the plates is so strong that the material between them is compressed slightly. If we could put enough electricity into the condenser, we could crush the plates.

We can consider what would happen if the condenser were charged up and then let discharge. A gap is placed across the terminals of the condenser, as shown in Fig. 3. When the condenser

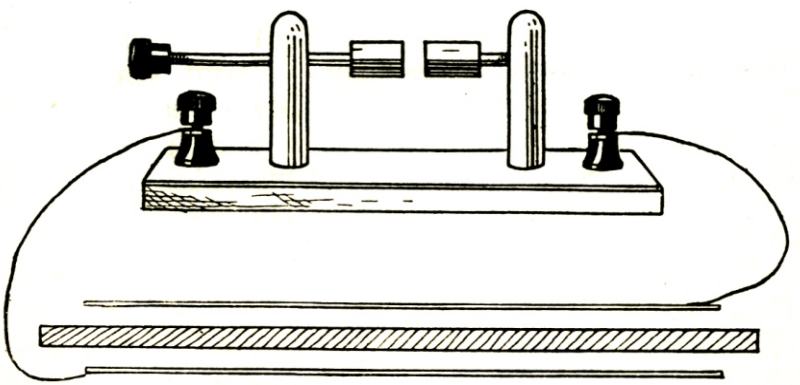


Fig. 3

has stored up enough electricity its voltage becomes so great that it jumps across the gap, and the electricity follows with a snap and spark. As we watch it there appears to be but one flash. However, there is a rapid succession of sparks from one side of the gap to the other and back again. Each spark becomes a little

weaker than the one before it, until finally the sparks die out altogether. To make this clear in our minds, we can consider a pendulum swinging as shown in Fig. 4. The pendulum starts in with a big bold swing, which gradually dies out just as our condenser charge dies out with its sparking. This process of swinging back and forth is called **oscillation.** We speak of a condenser as giving an oscillating spark or an **oscillatory** discharge.

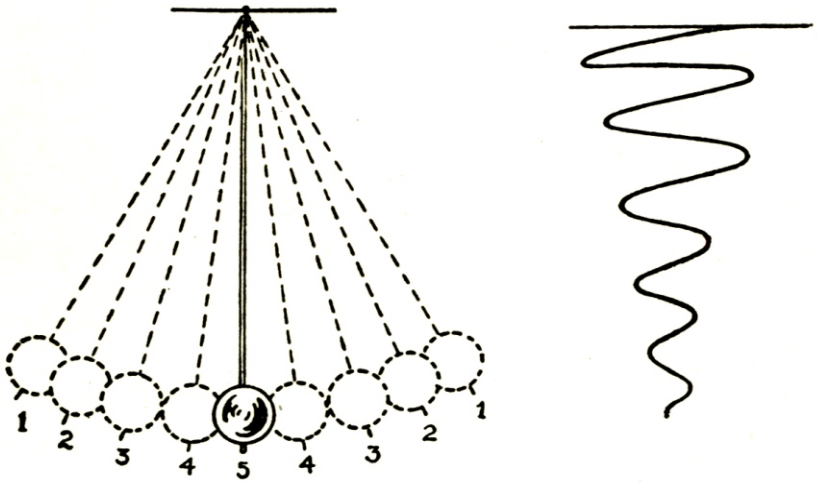


Fig. 4

A condenser oscillates at the almost unbelievable rate of 1,000,000 to 1,500,000 sparks per second. The rate at which it sparks depends upon its size; some condensers giving as low as 25,000 sparks per second.

Electrical waves are sent out by the rapidly discharging condenser. This discharge of electricity forces out electro-magnetic waves, which extend in ever-increasing circles, as do water waves when a stone is thrown into a pond. These waves could be picked up at a receiving station, and by means of a code, messages are transmitted.

THE ANTENNA

However, with practical wireless telegraphy, such as is used to communicate over several miles, we have more than a condenser. You have probably seen the aerials which other amateur operators have erected on the roofs of buildings, between trees, and on poles.

Why are these used? If we connect one end of our condenser to the spark gap and then to the aerial, the other condenser terminal to the spark gap and then to the ground, we are able to transmit electrical waves which would be much stronger than could be sent out from the condenser alone. An aerial at the receiving station is also necessary.

THE ETHER

Here we have shown in one city, say New York, a sending aerial. In Chicago, suppose we have located the receiving station. We

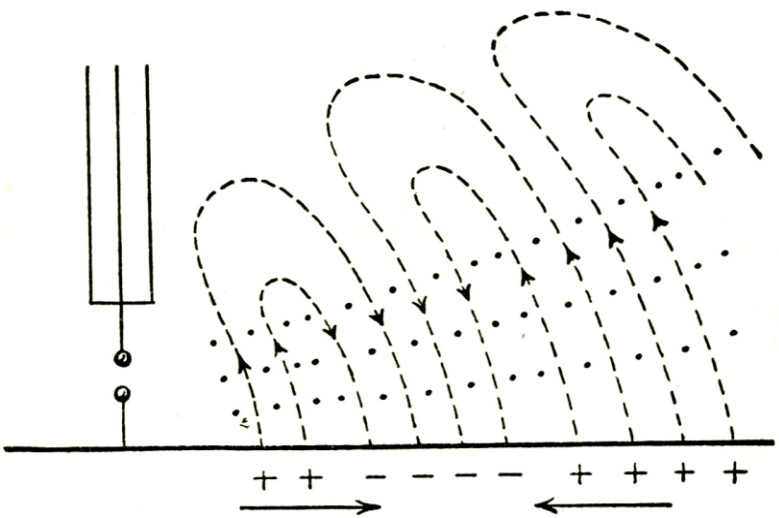


Fig. 5

can send waves from New York to Chicago without any wires. How are they sent? Scientific men never think of a **cause** and an **effect** without some connecting link. That is, we have the sending set in New York, which is the cause, and the receiving in Chicago, which is the effect. Where is the connecting link? We call it wireless, that is true enough, but there must be something on which we can send the wave. This something we call the **ETHER**. Scientists have assumed that all space is filled with a "something" to which the name of ether has been given. Wireless or electro-magnetic waves are transmitted through the ether, just as water waves are transmitted through water, or sound waves through air.

Let us look at Fig. 5 so we may get a picture of the wireless waves as they are sent out from the antenna. As the condenser

discharge runs up into the wires and down into the ground, a certain electrical field is made between the antenna and the earth. This strain is the beginning of a wave which extends out from the antenna in all directions to the receiving station. Fig. 6 illustrates the similar case of water waves which are sent out when a stone is thrown into a pond at A, being the sending point, and are received at B, which is the receiving.

THE RECEIVING

We have succeeded in following the waves as they branch from the sending station. Suppose they have reached Chicago. The waves strike the antenna because it is in their path. Do not think of the antenna as attracting the waves; it does not. As the wave strikes the wires of the aerial in Chicago, it creates in

Fig. 6

them an electrical charge similar to the one which we put into the sending antenna. At the same time, the wave has proceeded through the earth connection, so that both the wave through the ether and the wave through the ground reach the receiving aerial at the same time, or, if you wish, you can consider the waves as

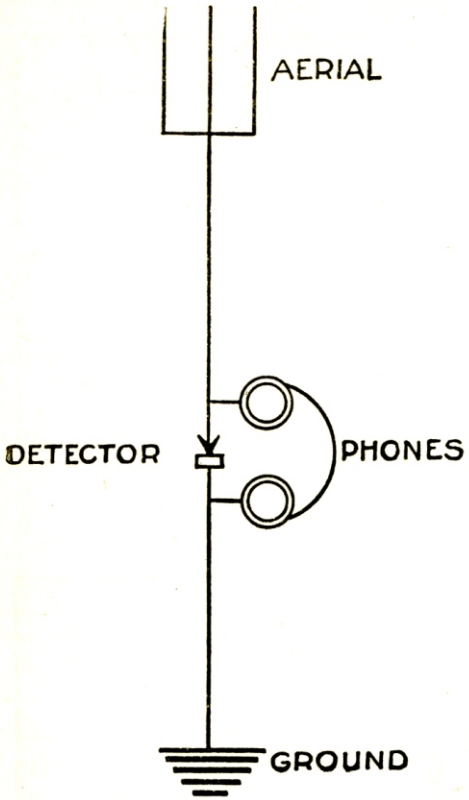


Fig. 7

reaching the receiving station through the ether and going back by way of the ground to the sending station to complete their circuit.

The electrical current set up in the receiving antenna is brought into the operating room, where we make the signals audible by means of a telephone receiver and what is called a detector. Fig. 7 shows the connections at the receiving station. It will be necessary to pause here to tell you what the detector does.

The detector is a device for making the wireless signals audible. Under the description of "Wireless Waves," page 9, you were told that a condenser oscillates with a frequency in the neighborhood of 1,000,000 sparks per second. This is so rapid that it cannot be heard by the human ear. To make the signals audible, we must cut out some of the million sparks. This is what the detector does, and the connecting phone gives us the instrument in which we hear the wireless signals.

SUMMARY

You have seen how it is possible to send out a wireless wave from one antenna through the ether to another, induce a current in this, have it operate through a detector, and a phone, and back through the ground to the sending station. In order that you might more easily understand this first principle of wireless transmission, we have purposely left out a great many terms, which might only confuse you. The apparatus described is the simplest with which we can explain wireless communication. In order that we may exchange ideas by wireless, we send the waves out in a series of long intervals or short ones. The long one is a dash when received or sent; the shorter, a dot. In this manner, by means of a code, we are able to transmit words and messages by wireless telegraphy.

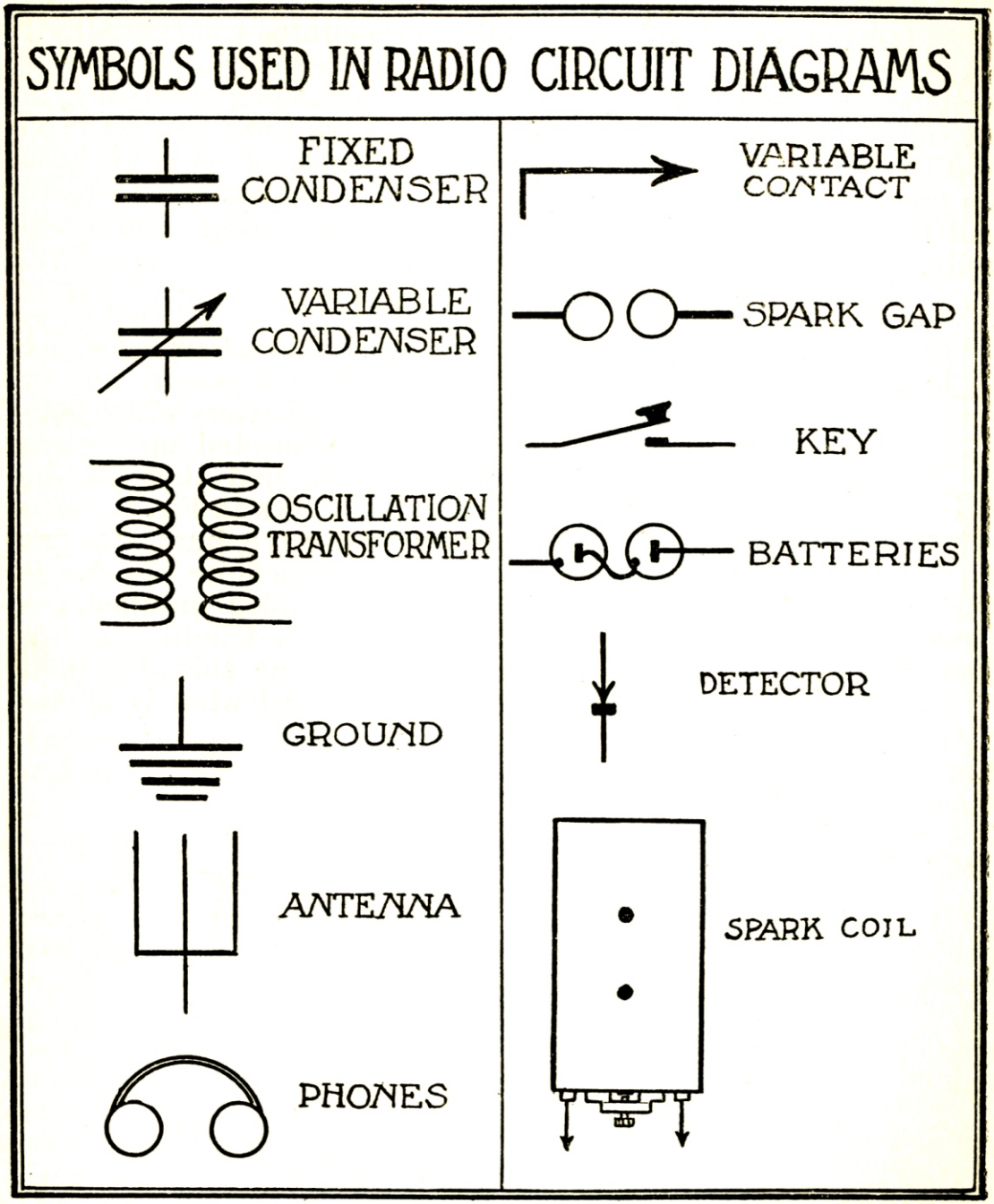
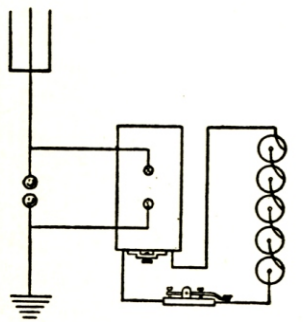

SYMBOLS USED IN RADIO CIRCUIT DIAGRAMS
FIXED CONDENSER
VARIABLE CONDENSER
OSCILLATION TRANSFORMER
GROUND
ANTENNA
PHONES
VARIABLE CONTACT
SPARK GAP
KEY
BATTERIES
DETECTOR
SPARK COIL

Fig. 8

APPLICATION OF THEORY TO APPARATUS

As it has been explained, not all the apparatus was considered in the first part of the book. We shall now tell about the instruments used. While wireless apparatus is changing from day to day, all the instruments described here are the most general type used by amateur operators. A clear knowledge of the apparatus is a great help toward becoming a proficient operator. If you will read the next part with care, it will make operating come more easily.

SENDING APPARATUS



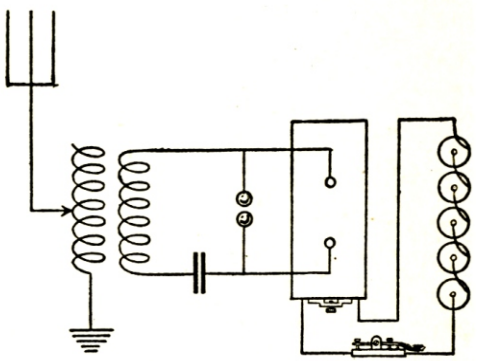
UNTUNED TRANSMITTING SET

Fig. 9

In the sending set of amateur type, we start first with some source of power. Six or eight dry cells will make a battery which does very well. These are connected up with a key, gap and spark coil, and then to the antenna and ground as shown in Fig. 9. This will send out a wireless wave, but it has one fault—the wave is not of definite length. It is rather broad and is called **untuned.** A wave which does not have a definite length is not desirable. To overcome this difficulty, we connect a condenser and what is known as an oscillation transformer, as shown in Fig. 10.

THE OSCILLATION TRANSFORMER

When we connect an oscillation transformer, condenser and spark gap, as shown in Fig. 10, it is found that a wave of definite length is sent out. The size of the waves sent out by the apparatus depends on the size of the condenser and oscillation transformer. If we have a large condenser and a large amount of wire in the transformer, we find the sending wave is also large. By having different sizes of condenser and different amounts of wire in the oscillation transformer, we can send out waves of varying lengths.



TUNED TRANSMITTING SET

Fig. 10

Fig 12 shows the connection which is known as the **primary circuit,** consisting of gap, condenser, and one part of the oscillation transformer. The other part is connected with the aerial and the ground, and is known as the secondary circuit. The secondary circuit has an adjustable wave length which depends on the length of the antenna and the number of turns of wire of the secondary in use. In actual practice, the wave lengths of the primary and secondary are made the same, and a wave is sent out which can be measured.

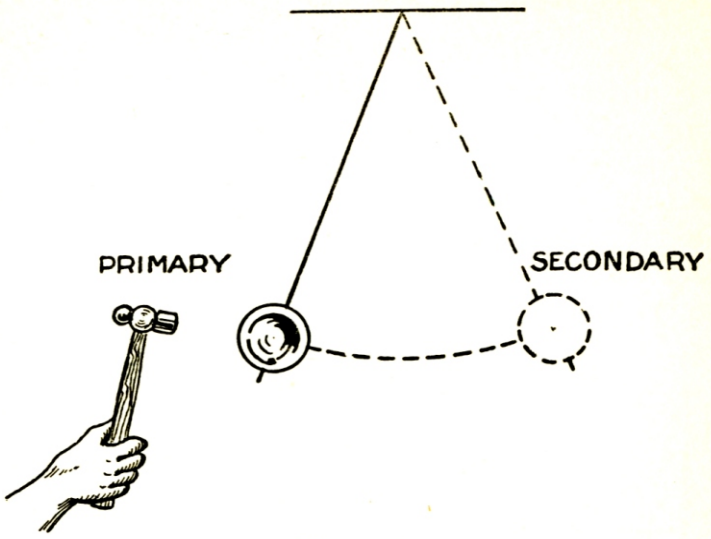


Fig. 11

The question of tuning the sending set is a rather complicated one, and we can best picture it by a simple comparison with a

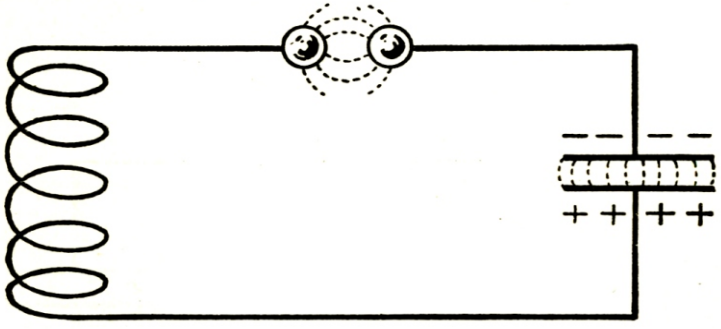


Fig. 12

pendulum. Consider Fig. 11. This picture shows a pendulum in motion with a hammer ready to tap it at the proper moment, so that it will be kept swinging. This is just what the primary circuit does to the secondary. The primary circuit supplies the

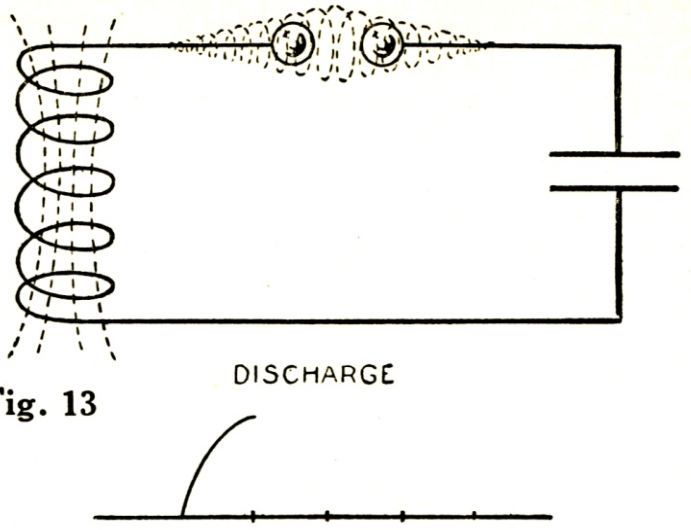


Fig. 13

energy to the secondary circuit at the proper intervals so that wireless waves of the right length are being sent out and are reinforced at the proper time.

THE TRANSFER OF ELECTRICAL ENERGY BY INDUCTION

Electro-magnetic induction is a term which you are already familiar with, having found it in the GILBERT Elementary Electricity. Induction plays a very important part in connection

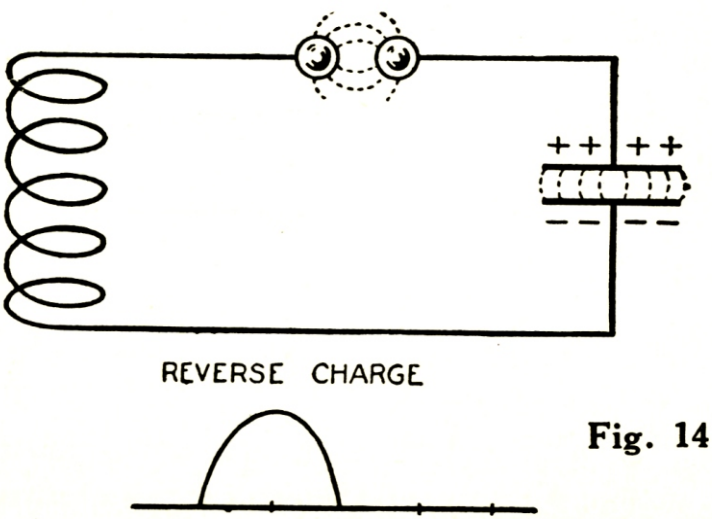
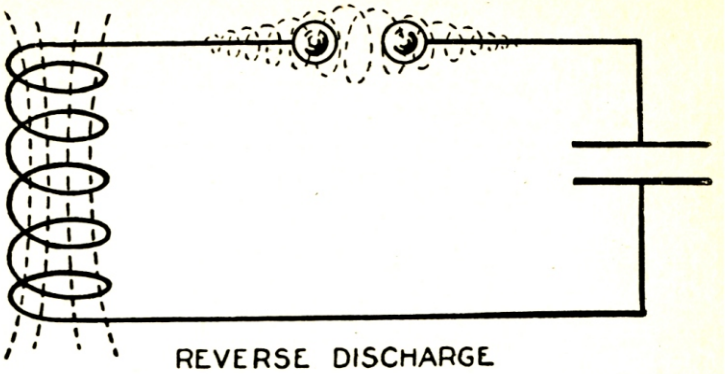


Fig. 14



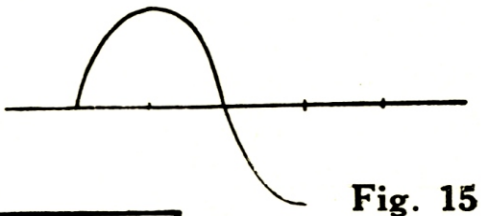
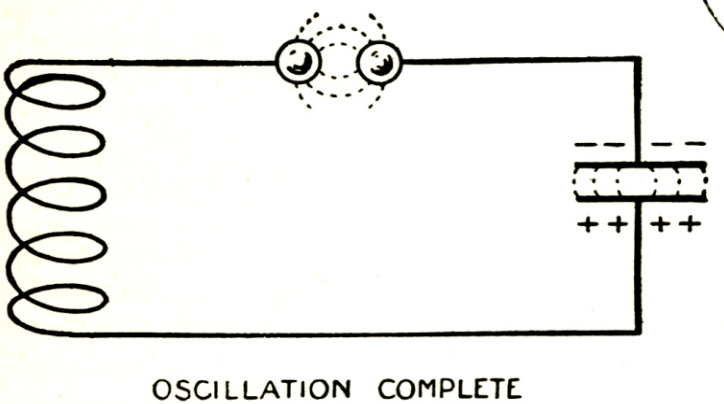


Fig. 15



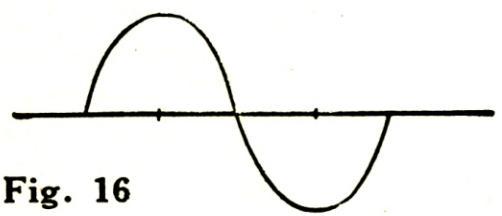


Fig. 16

with the oscillation transformer. The energy is transferred from the primary circuit to the secondary circuit by means of electro-magnetic induction.

When an electric current flows through a wire, it is accompanied by a series of magnetic lines of force which surround the

wire. On the other hand, we can surround a wire by a series of magnetic lines of force and have it set up a current when the lines of force move. That is, if instead of the current moving, we have the magnetic lines cut the conductor, they will set up an electrical current. In the case of our primary and secondary, a similar thing takes place. The current flowing in the primary circuit creates magnetic lines of force, and these, in turn, set up an electrical current in the secondary circuit.

Figs 12, 13, 14, 15 and 16 tell the whole story. They show the four stages which accompany a complete oscillation at the spark gap. Fig. 12 shows the condenser charge and the current going across the gap. As the current passes, it goes into Fig. 13, which shows the magnetic lines of force around the gap and oscillation transformer. Fig. 14 shows the change reversed, and Fig. 15 shows the reversed electro-magnetic field. Fig. 16 brings the circuit back to the original case.

As the magnetic lines of force which we have shown in the primary circuit break down, they cut the wires in the secondary of the oscillation transformer and a current is induced. This current oscillates just as the condenser current, and the energy from it flows up into the antenna and down to the ground, sending out the wireless waves.

SENDING WAVE LENGTHS

Since we have found out that various wave lengths may be used, we can increase our knowledge if we have some idea as to the actual length of these waves. If, in the primary circuit, we have for a condenser ten glass plates, 8 x 10 inches, coated on each side with tinfoil, 6 x 8 inches, connected together and used with one turn in the primary of the oscillation transformer, which is $8\frac{1}{2}$ inches in diameter, we send out a wave which is approximately 200 meters, or 657 feet.* The wave length of an antenna without the secondary coil may be found approximately by taking the total length of the antenna and ground wires in meters and multiplying by 4.7. For example, if we take an antenna with a length of 65 feet, a lead of 25 feet, and a ground connection of 30 feet, the total length in feet is 120; this changed to meters is approximately $36\frac{1}{2}$, and multiplying by 4.7 we get about 175 meters for

*1 meter = 39.37 inches or approximately $3\frac{1}{4}$ feet.

the wave length of the antenna without the secondary coil in the circuit. By adding the secondary coil, we increase the wave length.

In actual operation, amateur stations have been limited by the Government to wave lengths up to 200 meters. Commercial stations operate on 300 and 600, while the Government stations from 600 up. A few stations operate on wave lengths of 1,000 and 1,500 meters. The big Government station at Arlington, Virginia, sends out the weather reports and time signals on a wave length of 2,500 meters.

THE SPARK GAP

We have already explained how a condenser works, and it will not be necessary to consider this question any further from the standpoint of sending. In the primary circuit, another important piece of apparatus is the spark gap. Its work, as we have seen, is to allow the condenser to discharge and thereby set up the oscillation with which we transmit signals. When connected with a spark coil, a plain fixed gap is used. When used with a transformer, a rotary gap is usually made to take the place of the fixed one. The rotary gap consists of a rotating wheel with a number of sparking points on it, as shown in Fig. 17. When the wheel rotates, large numbers of sparks are had per second, due to the speed with which it travels. This gives a musical note, and we are able to transmit very effectively with it.

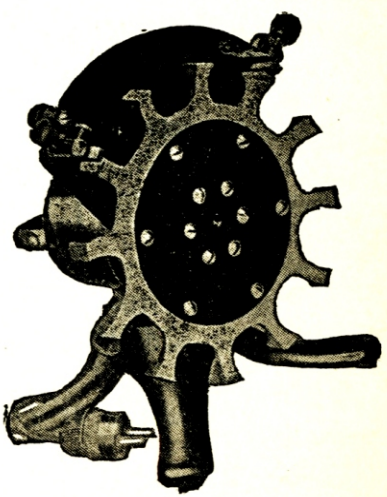


Fig. 17

We have left last for description some of the things which come first as they are connected in the circuit. We supply the condenser with high-voltage current from either a spark coil or a step-up transformer. The current, which is supplied to this step-up device, is broken into dots and dashes by means of a telegraph key.

SENDING APPARATUS

Now that we have considered the different units of the sending set, we can connect them all together and consider its operation

as a whole. Fig. 18 gives a complete hook-up of a sending set comprised of batteries, spark coil, key, condenser, gap, oscillation transformer, aerial, and ground. Let us trace the course of the current and find out just how it acts. The key is closed; this completes the spark coil. The current which flows through the

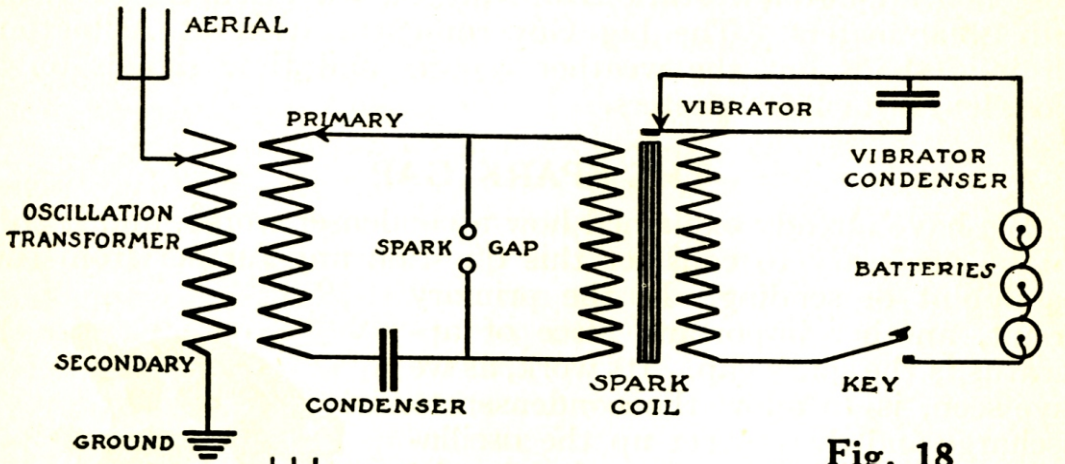


Fig. 18

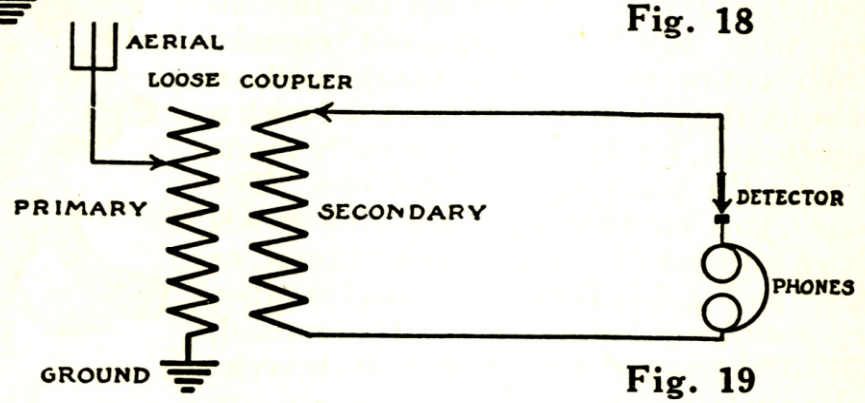


Fig. 19

coil is interrupted by means of a vibrator and it is stepped up in voltage from about ten volts to 20,000. It then passes into the condenser, and the electrical energy is stored up until it reaches a point where it can jump the gap. In crossing the gap, the current passes through the primary of the oscillation transformer, setting up magnetic lines of force, which cut the turns of the secondary of the oscillation transformer. The lines of force disappear and a current is induced in the aerial circuit. This current turn creates the wireless waves which travel out from the aerial and through the ground in all directions.

RECEIVING APPARATUS

What takes place in the receiving apparatus is not unlike that which takes place at the sending station. Instead of an oscillation transformer, we have a receiving transformer or loose coupler. Its work is similar to that of the oscillation transformer at the sending end. The receiving transformer has a primary which consists of a number of turns of wire connected to the aerial and the ground. The secondary of the receiving transformer is connected to the telephone receivers and detector. (See Fig. No. 19.).

Let us follow the wave as it comes in from the antenna. When the electrical oscillations are received, they are similar to the currents set up by the condenser. If we represent them with a line, it would look not unlike Fig. 20. The sound we hear is made up of a series of the rapid condenser discharge groups. This is received by the primary of the loose coupler, which can be made to receive a large number of wave lengths by using either a few or a great many turns of wire. That is, we can add wire to the aerial by means of the primary and increase the wave length so that the apparatus can be tuned to receive any number of stations sending on different wave lengths.

The current which is received in the primary sets up a similar current in the secondary, and here again the amount of wire can be varied so that the secondary circuit can be made to have a wave length the same as that of the primary. If the primary is receiving a wave 300 feet long, the secondary is adjusted so that

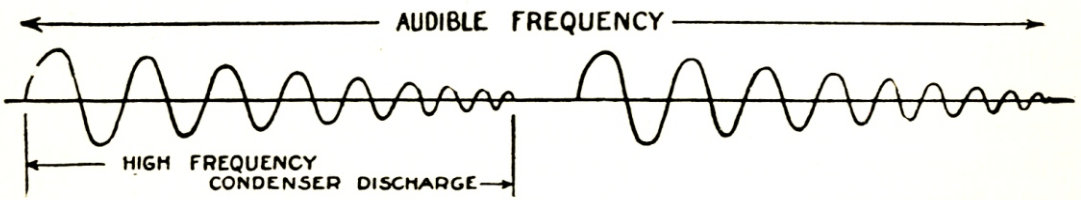


Fig. 20

it will receive a wave of similar length. When the two circuits are tuned alike they are said to be "in tune," or "in resonance." When two circuits are in tune, the greatest amount of energy can be exchanged between them. In other words, we can get the full strength of signals from the primary to the secondary.

TELEPHONE RECEIVERS

We have succeeded in tracing the wireless waves to the secondary of the loose coupler. If a pair of 'phones is connected, we would **not** be able to hear any signals. The reason is clearly shown when we think of the nature of the current. The current is oscillating at a very rapid rate; in the neighborhood of 1,000,000 times per second. If we should attempt to move the diaphragm of the

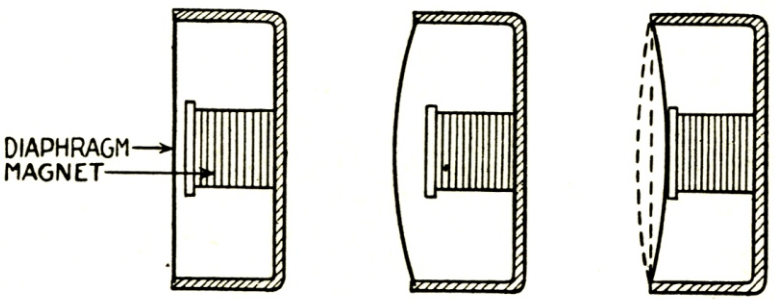


Fig. 21

telephone receivers, Fig. 21, at the rate of 1,000,000 times per second, it would be moving so fast that it would not "move at all." Even if it could move, it would be making a noise so very high in note we should be unable to hear it. To make the signals audible, we put in the circuit a detector. See Fig. 23.

DETECTORS

We have said the work of the detector is to make the signals audible. The manner in which it does this is interesting, and one cannot understand how a set works without considering it. The current which comes in is similar to the illustration in Fig. 22. The detector has a peculiar property of allowing this current to flow through it more easily in one direction than in the other. It takes the current and cuts out one-half of it, similar to the illustration already mentioned. This decreases the frequency and the sounds are allowed to act in groups which become audible.

Fig. 23 shows a detector which is known as a Crystal. The crystal consists of some mineral such as silicon, carborundum, galena, or even common coal. One connection is firmly fixed, while the other is a fine wire with which we "feel" over the surface

of the crystal. The fine wire strikes a spot which is more sensitive to the wireless waves than other parts of the mineral which are less sensitive. We may find a great many sensitive points on one mineral, while another will not be nearly as good a detector. Galena is one of the most sensitive detectors, but very delicate and usually hard to adjust. Once in adjustment, it can easily be

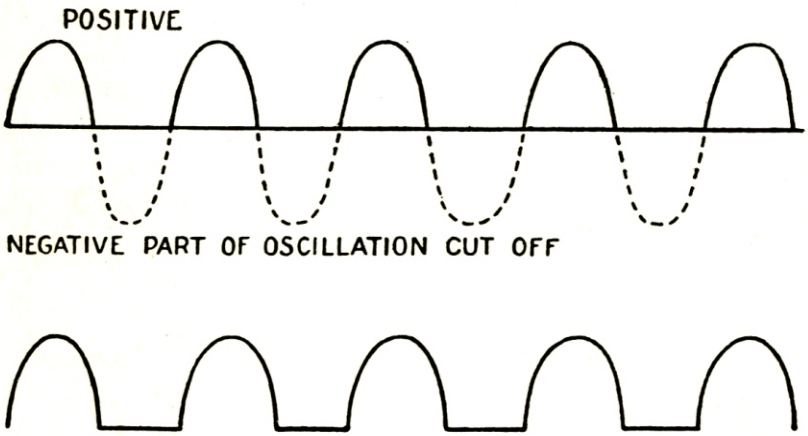


Fig. 22

knocked out by jarring the detector base. Silicon is rather easy to adjust and fairly sensitive. There are no end of minerals, and every experimenter has plenty of room to try his skill in this direction. The writer remembers occasions when he has been able to receive signals over distances of 75 to 300 miles on a piece of coal.

CONDENSERS

In the receiving set we can have condensers as well as in the sending. It is possible to connect a condenser across the primary or secondary of the receiving transformer and increase the wave length for receiving signals. In actual practice, a variable condenser is used. One is illustrated in Fig. 24. In a variable condenser, air acts as the insulating material, and the capacity is made large or small depending on the amount of area between the fixed and rotating plates.

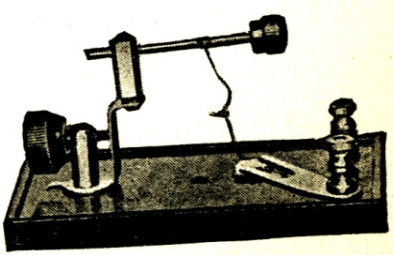
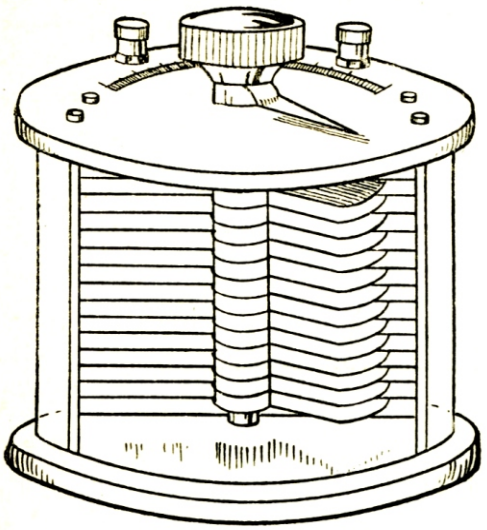


Fig. 23



ROTARY VARIABLE CONDENSER

Fig. 24

It is more customary to connect the variable condenser in the secondary circuit since it enables sharp tuning.

Small condensers are often used in connection with the telephones when a crystal detector is employed. The effect here is often to increase the loudness of signals and at the same time the tone is changed slightly.

AERIALS

In a wireless set, the aerial or antenna is a device on which the electro-magnetic waves are received. When the waves flow past the antenna they create an electrical charge in it which flows through the antenna to the ground to complete the circuit. In erecting an antenna, you must take into account the length of waves which you expect to receive. Under "Sending Wave Lengths" we have told how the natural wave length of an antenna may be calculated.

The big Government station at Arlington has towers to support its antenna which are 450 and 600 feet high. The majority of amateur stations have antennas which are under 100 feet in height. For ordinary work, an aerial 50 feet high will be very effective for amateur use. Its length usually depends on the conditions where it is to be erected. In some cases amateurs stretch their aerials from house to house, or from house to tree, and when no suitable support can be found, a pole is erected. The length of an antenna, to work with the GILBERT Wireless Sets, may vary from 30 to 200 feet long.

As to the number of wires, from one to six may be used. Very little difference is noticed in receiving for one wire antenna or six. In the case of sending, the difference is more marked. The more wires in the antenna, the greater help is given to the sending set. In aerials which have more than one wire, they should be spaced

approximately one-twenty-fifth of their length; that is, if we have an antenna fifty feet long, we should space the wires two feet apart. The usual construction brings all the aerial wires to the switch which connects the antenna to the sending or receiving apparatus. The part of the antenna which connects from the main wires to the apparatus is called the lead-in. An antenna construction of suitable size is shown in Fig. 25.

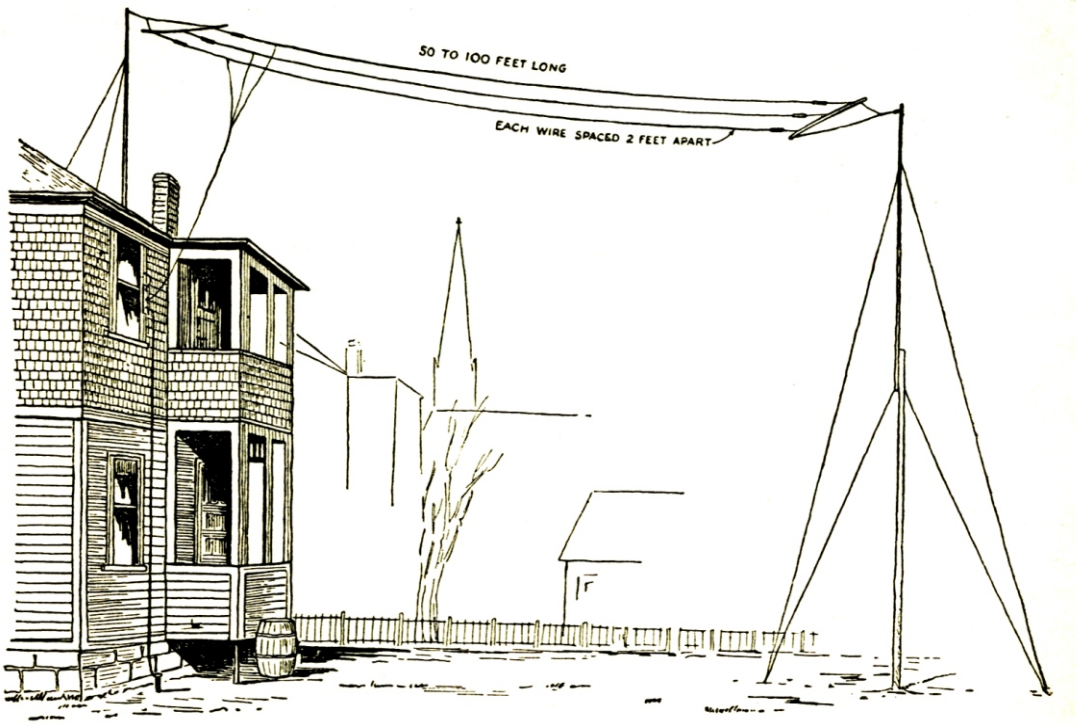
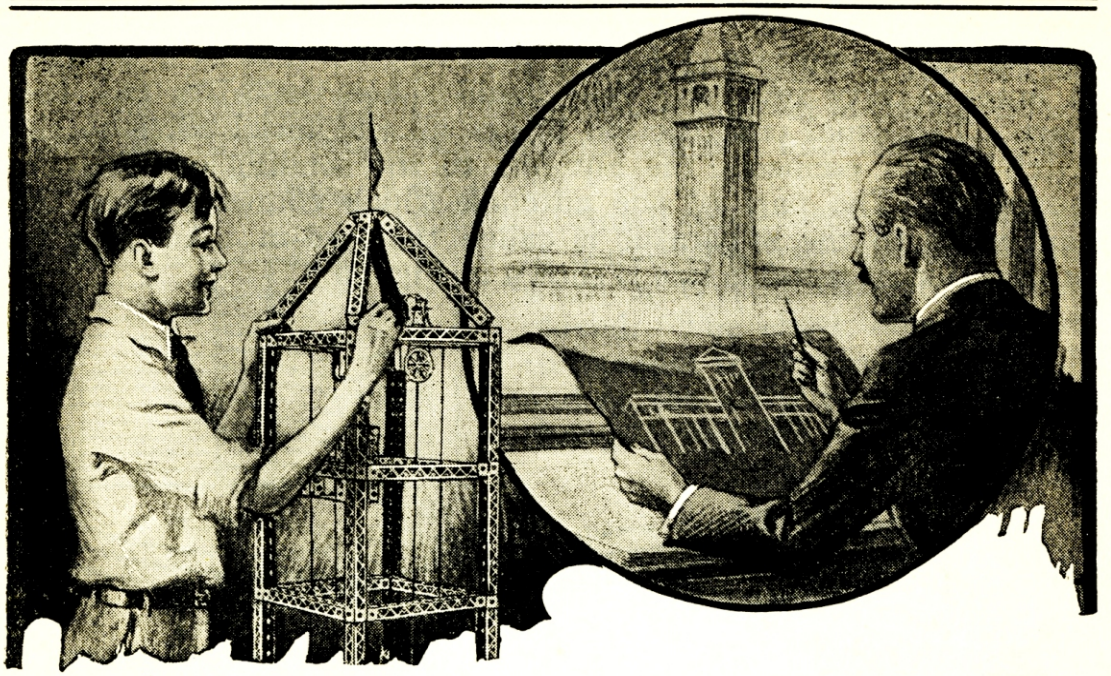


Fig. 25



ERECTOR

THE TOY LIKE STRUCTURAL STEEL

Erector has been on the market for so long and so many boys already have it that I'll bet lots of you fellows know as much about it as I do. Why, say, isn't it corking great stuff to build bridges, towers, elevators, and all sorts of structural steel buildings with. Honestly, it even surprises me sometimes when I'm working on a model to see how quickly and easily it puts together, and the number of things I can build with it.

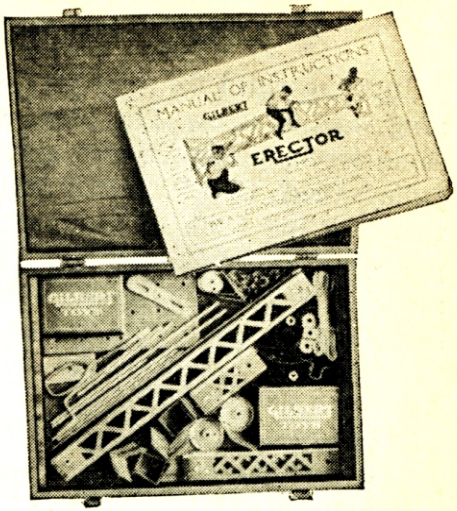
That's the beauty of having a toy that is correct in construction, and Erector surely is. It is structural steel in miniature, just like the big steel that goes into drawbridges, traveling cranes, skyscrapers, battleships and almost everything you can think of. Boys, it is genuine—and that means you can do something real with it. That's why so many boys immediately think of Erector when they want a steel construction toy. They like the real four-sided girders, the steel-angle irons, shaftings, wheels, pinions, pulleys, nuts and the many parts that come only in Erector.

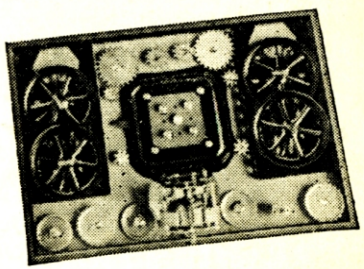
In fact there's hardly a boy in America who hasn't heard of Erector and knows that the models he can build with it are just like the real thing that workmen build.

I've watched Erector grow from nothing until it is to-day the best known toy in the world, and I know that if you haven't already an outfit that you don't know the fun you are missing.

A. C. Gilbert
President

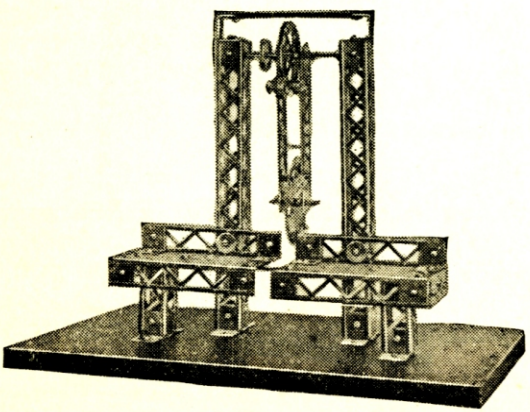
THE BIG
No. 6 Erector





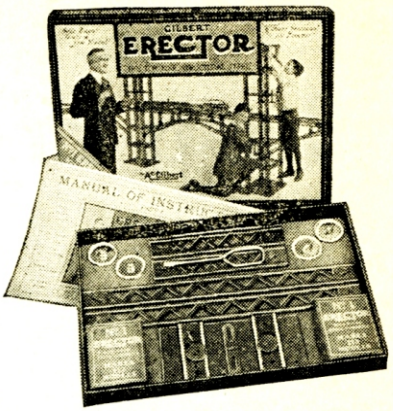
Here's the famous No. 6 Erector. I call it the famous No. 6 because it is a popular choice among boys. Contains just the right number of parts for building crackerjack models. There's special gears, gear-sides, plates, standard Erector girders, angle irons, shaftings, etc. Each piece is structural steel in miniature just like the steel that goes into draw bridges, cranes, skyscrapers, battleships and almost anything you can think of.

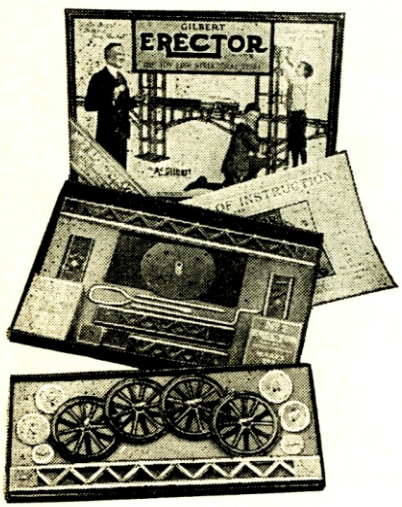
You will like the real four-sided girders, the steel angle irons, shaftings, wheels, pulleys, nuts and many other parts that come only in the Erector. Included is a motor to provide motive power for your car, elevator, or derrick models. It will make your model natural-looking—make it move in real fashion. This motor will do that for you, and when you want to run your models the other way, there's a reverse base for just that purpose. There's no end of the pleasure you can get from this set. This is play—real play. Because this is so, Erector sets appeal to boys everywhere. They are something boys everywhere are glad to own and eager to talk about. This set is put up in a stained hardwood cabinet arranged to hold the parts conveniently and compactly.



ERECTOR No. 1

Just the outfit for a young boy who is beginning with Erector. The parts included are the same mechanically correct girders, angle irons, pulleys, etc., in all Erector outfits. Then, too, there's a big book of instructions giving complete directions for building many interesting models. Packed in the distinctive Gilbert Toy sealed carton, size 12¼ x 8¾ x 1¼ inches.



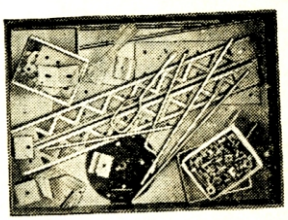


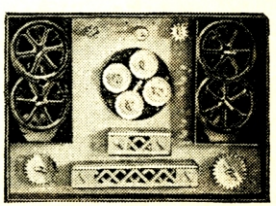
ERECTOR No. 2

A slightly larger Erector outfit than No. 1, containing in addition to the parts in No. 1 the Erector base plate, shaftings, and complete set of bright red wheels for building wagons, trucks, etc. The big book of instructions shows some models that you'll like. Packed in the original Gilbert Toy sealed carton with tray size 12¼ x 8¾ x 1¼ inches.

ERECTOR No. 3

Here's an Erector Set that you'll enjoy. This one includes the standard Erector gears and pulleys, besides a liberal assortment of girders, shaftings, angle irons, base plate, bolts, nuts, screws, etc. With this outfit you can build any number of unique and modern models. The book of instruction included gives complete directions and shows pictures of many. Packed in a Gilbert Toy sealed carton, size 12⅜ x 8¾ x 2 inches.

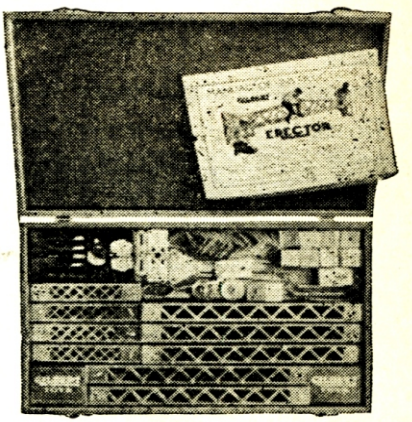




No. 7

Erector No. 7

Quite a complete set for the boy who is old enough to make difficult models. It contains many parts for building most of the models shown in the book of instructions which comes with the outfit. There is included a motor and a reverse base to operate the crane, derrick or elevator that you make. The fact that you use motive power in your work adds to the reality of it. All the parts of the standard Erector equipment packed in hardwood cabinet 12¼ x 20¼ x 3½ inches. Weight approximately 18 lbs.



Erector No. 8

An advanced set containing a sufficient number of parts to do most any kind of building. You can build some wonderful models with this outfit, such as locomotives and things requiring care and study. You will not be limited in your work; you can build some very big models requiring a whole lot of girders, angle irons, shaftings, nuts, bolts, etc. Of course, the powerful Erector motor is included, together with reverse base and control switch. Packed in hardwood cabinet size, 12¼ x 20¾ x 4¾ inches. Weight approximately 32 pounds.

No. 8

No. 10

Erector No. 10

The largest and most complete Erector set made. You can be sure that with the assortment of parts in this outfit you will have no trouble in setting up models of the most difficult machines. There's the crackerjack Erector motor, reverse base, control switch, girders, angle irons, shaftings, nuts, bolts and everything you could wish. Packed in hardwood cabinet with trays to hold the different pieces in the right place, size 12 x 20 x 3½ inches.

Hydraulic and Pneumatic Engineering

Hydraulic engineering is the engineering which deals with water and other liquids.

Pneumatic engineering is the engineering which deals with air and other gases.

Boys, have you running water in your homes? If so, do you know how it gets there?

If you live in a city, your running water is supplied in one of three ways: first, it is pumped into a standpipe or reservoir; second, it is brought from a distant lake or stream at a higher level; or third, it is pumped directly into the city mains.

If the town is situated near a hill, the usual practice is to build a large cement-lined reservoir on the hill and to pump the water into this instead of into a standpipe. In either case the water runs by gravity through the mains and submains to the houses, hydrants, etc.

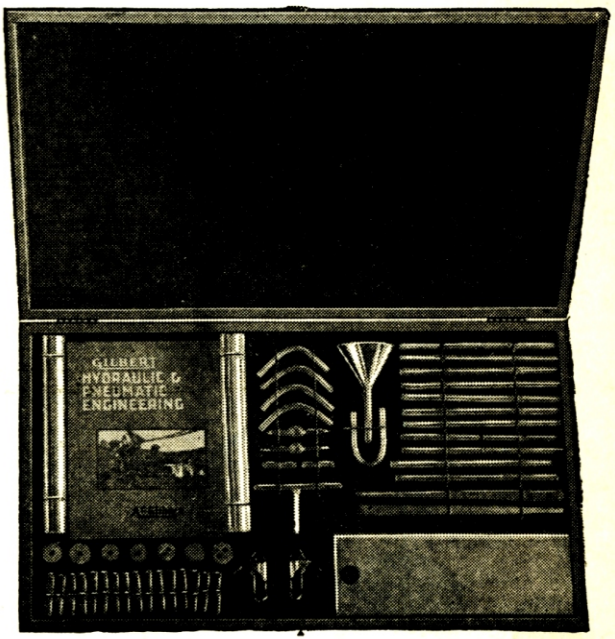
If the city is very large, the usual practice is to bring the water from a lake or stream at a higher level. New York is supplied with water in this way. If the city is very large, and if an elevated lake or stream cannot be found within a reasonable distance, the usual practice is to pump the water directly into the city mains, from the nearest river or lake.

In all cases the greatest care is taken to see that the water is pure. The land bordering the elevated lake or stream is kept free from all sources of contamination, and in addition the water is filtered. If the water is pumped from a lake, the intake pipe is run out into the lake for a long distance to get the purest water, and in addition the water is filtered. If the water is pumped from a river near the city, it is taken in above the city and is filtered.

Boys, that's just a few of the things you will learn about with a Gilbert Hydraulic and Pneumatic Engineering Outfit. You'll find out how elevators run, how big ships are raised from the bottom of the ocean, and many other fascinating facts. Best of all you will get a knowledge of a lot of things that most boys do not understand.

GILBERT
Hydraulic and Pneumatic Engineering

No. 6501



Real fun—that is what this set will provide for you. Think what it means to you to be able to construct models of water systems—to make trench guns with which you and your chum can have a real battle! Learn how ships that have been sunk are raised—interesting facts about the submarine, the depth bomb, and torpedo. There are many fascinating experiments that you can do to illustrate a great many scientific facts which explain the important inventions so well known today.

A Gilbert Hydraulic and Pneumatic Outfit will please you in every way because it is an equipment you can use as often as you like and never grow tired of it. After you have read the book of instructions that comes with each set you can use your apparatus to make models of big construction work, build a miniature water supply system of your own, and in many ways get a good knowledge of the big problems engineers have had to solve. You will soon be in a position to tell your boy friends accurately the importance of this branch of engineering. They will listen eagerly to the facts you can tell them and will want to join in the fun that you get from your set. All the necessary apparatus for preparing many interesting experiments is included in this outfit. Comes packed in a stained hardwood cabinet, 18¾ x 10⅞ x 2⅞ inches. Weight approximately 4 pounds.

MAGNETISM

Sometime during the first hundred years A. D., wide-awake men and boys living around Magnesia, which is a town in Asia Minor, found pieces of hard, black stone which would pull or attract iron to them or would be pulled or attracted to the iron itself. Probably the first man to discover this found little pieces of this black stone clinging to the iron tip of his traveling staff, which all the wayfarers used in those days. This peculiar black stone is found in several places in the world, and is a kind of iron ore.

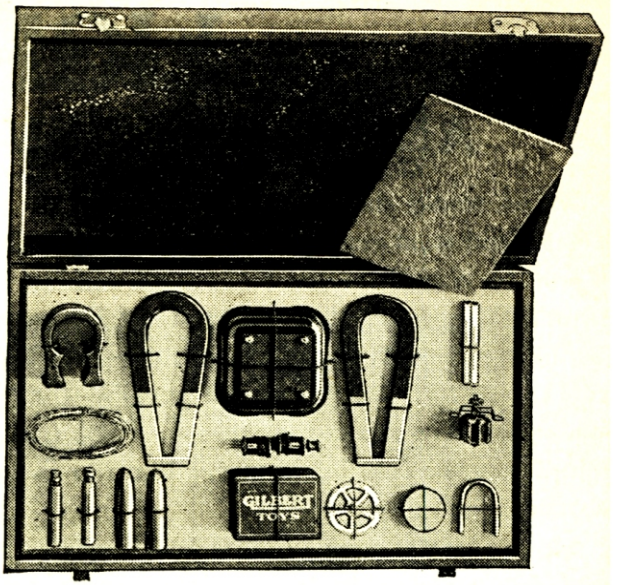
A long time afterward, some unknown man discovered that if you hung one of these black stones on a thread, or made a raft of cork or wood and laid the stone floating in a basin of water, a wonderful thing happened. The stone turned and pointed nearly north and south! The Chinese found this out perhaps sooner than the Europeans, and put this peculiar quality to work as the earliest form of compasses on their sailing vessels. Before this time, men had to depend entirely upon the sun and stars, and if a fog came up or a night was cloudy, they lost their way and were often wrecked.

Men familiar with minerals have given this iron ore the name of "magnetite," which, you see, sounds very much like "magnet." Sailors who used these stones for guidance over the seas called them "lodestones," which in those days meant the same as "leading stone."

Did you know that the simple compass is one of the first magnets discovered? Men have found various other magnets after long years of search and have gradually learned how to use them. Today ships not only are guided through the fog, but are also lighted by electric lights, signals sent across the ocean, elevators run, bread baked, and numberless other things done by the help of magnets.

Gilbert Magnetic Fun and Facts

No. 6505



Did it ever seem strange to you that a compass always points to the North? Do you know why it does —what it is that attracts the fine needle point of the compass? Very few boys do. The boys who do not are the boys who have never heard of magnetism and do not realize what a tremendous effect it has on our everyday life.

Gilbert Magnetic Fun and Facts is an outfit that you will find intensely interesting. It explains in a very easy way all about the compass and many other things besides. It shows you how to build a simple magnetic motor, a corking little electric shocker, a magnetic tight rope walker, magnetic jack straws, a magnetic navy and any number of electrical tricks with which you can surprise your friends. You'll like this outfit and the big book which comes with it telling you many things about electricity and magnetism you never dreamed of.

The boy who knows about different kinds of engineering—electrical, chemical, structural, etc., the kind that are covered by Gilbert Toys—is the type of a boy who will be a leader among his fellow boy friends. He is the boy whom the rest of the boys look up to and they only do it because they appreciate that he has a knowledge of different things which they don't understand.

Gilbert Magnetic Fun and Facts will give you a pile of information on magnetism and a whole lot of fun at the same time. It comes packed in a stained hardwood cabinet, 18¾ x 10⅞ x 2⅞ inches. Weight approximately 5 pounds.

LIGHT
AND WHAT IT MEANS TO US

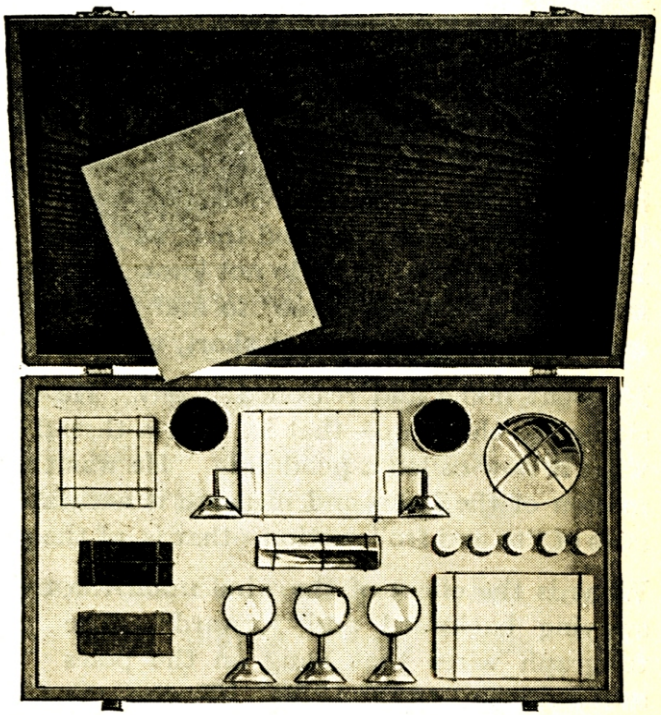
What would the world be without light? If you stopped to think about this you would soon realize that without light there would be no life at all. There would be very little vegetation and without this we could not live. The greatest illuminating body that we know of is the sun. This is the source of light on which we depend entirely. Perhaps you have been curious to know how light reaches us and what makes it possible for it to travel over so great a distance. There are any number of questions you can ask about the light we get from the sun, from the candle, from the lamp or even the electric lamp which is used so commonly to-day.

Have you at some time or another been in a dark room and noticed a small ray of light enter through a hole or crack of some kind? There are a great many important facts to write about that ray of light. From these we are able to understand why it is that eye glasses improve the sight, why the microscope helps us to see the tiniest particles. Then we can explain how the moving picture machine can operate giving pleasure as it does to so many people who go to the movie theatres. Do you remember when in bathing near the shore you put your head under water, the objects in the water seemed different to you than they would if you were on land? There is a reason for all these changes and you should know what causes them.

It's easy, and it's interesting, too. There will be as much fun in doing this as there was when you took a magnifying glass and burned a hole in a piece of paper, or when you held a mirror in the sun and reflected the rays so that they shone wherever you wanted them to. At the same time that you enjoy your play you get a good knowledge of light, what it is, what can be done with it and why we could not live without it.

Gilbert Light Experiments

No. 6515



What is light? Where does it come from? Where does it go to? What does it mean to us? Those are the questions that would stump you if you had to answer them. You probably don't know because you've never thought much about it, but you, as well as every other boy, should understand more about light. You should know how it affects our every day life.

With an outfit of Gilbert Light Experiments you can have some wonderful fun. So many things that are entirely different from the things you have been satisfied with until now. There's a big book on light with every outfit telling interesting facts about the sun and the suns rays, and how to make use of them. Then, too, it tells you how to give shadow shows, give an exhibition of freakish images that will amuse your friends.

While you are playing with this outfit, you will learn about the telescope, opera glasses, microscope, moving picture machine, and many other important instruments. You will learn too, why eyeglasses improve the sight and why a lens produces an upright image or an inverted one. There's a pile of fun in every one of these outfits for a boy. It is complete with lens, prisms, mirrors, and all necessary equipment. Packed in stained hardwood cabinet, size 18¾ x 10⅞ x 2⅞ inches. Weight approximately 4 lbs.

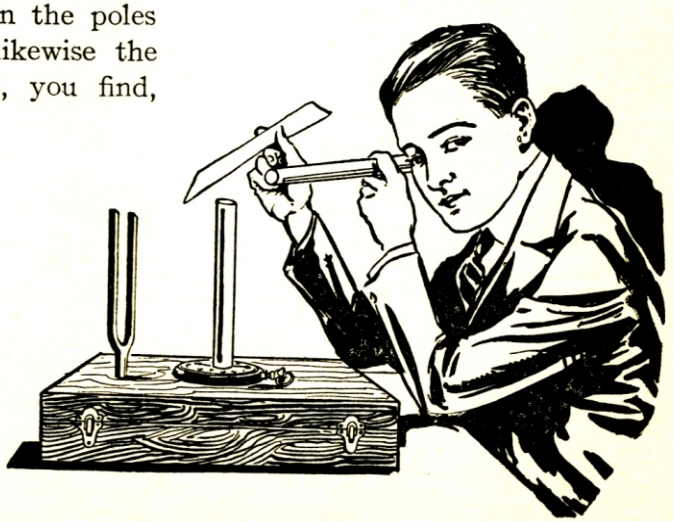
SOUND

Many hundred years ago there lived a great scientist, known as Galileo. He was born in Pisa, Italy, in the year of 1564, and was destined to be one of the greatest philosophers and inventors that the world has ever known.

As a boy he was bent upon a scientific career. He took up his study at the University of Pisa. On a certain afternoon when he was still a young boy he had occasion to visit the great Cathedral of Pisa. While he was there he saw the watchman lighting a lamp that hung from the ceiling of the cathedral. In order to light the lamp it was necessary for him to draw it down toward him, and when finished lighting it, he let go of the lamp and it swung back and forth. This attracted the attention of Galileo and, having a scientific trend of mind, he became interested in the movements of the lamp. At first the lamp swung in a long arc back and forth and then, as you all know, its motion grew less and less. But what you probably do not know, and the thing that struck him as intensely interesting, was that these "to and fro" movements or oscillations, whether the lamp was swinging wide or short, were always made in exactly the same time.

He went home and reasoned it out. He made a piece of apparatus that was similar to the lamp—that is, with a thread and weight attached to it, he made what is now called a pendulum. He was thereby able to duplicate the swinging motion of the lamp and measure it accurately. In this way he discovered the laws of "to and fro" motion—that is, of the pendulum and its vibration.

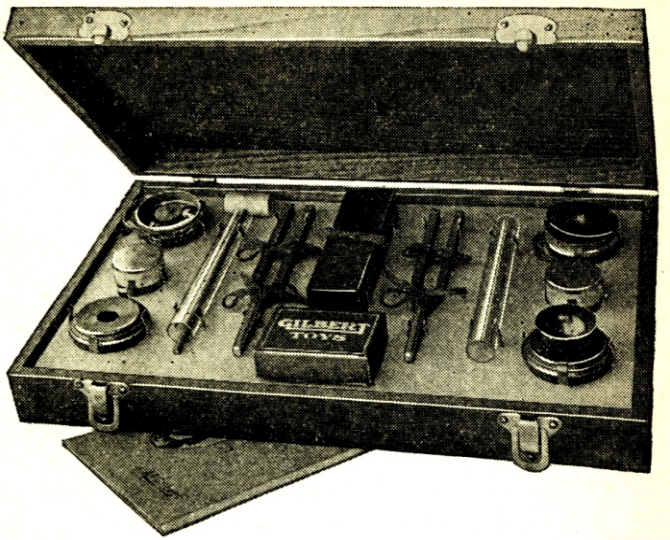
What is the effect of the wind upon the trees? Do we not find that they are swaying backward and forward? The telegraph wires that hang on the poles are swinging to and fro, likewise the waves of the sea. In fact, you find, if you experiment with a Gilbert Sound Outfit that all of these motions that we see about us and the sounds that come to our ears and the waves that carry the telephone messages and the telegraph and wireless messages, are all results of this "to and fro" motion.



Doesn't that interest you?

Gilbert Sound Experiments

No. 6520



Do you know that hearing is just feeling with the ear? That in reality, the thing we call sound, which we think of as a noise or as a musical note, is just an impression on the be brain? Very few boys know this, and if you would like to be one of the few that do, you surely want an outfit of Gilbert Sound Experiments.

With one of these outfits you can find out just what sound is—how it is produced—why some pianos sound better than others—why a violin produces a musical tone, and many other things, including a number of startling table rapping tricks with which you can astonish your friends. The outfit contains tuning forks and sound box, receivers, mallet, etc., and big book on sound telling how to perform many fascinating experiments with the apparatus in the set, and also shows you how to do many startling tricks with apparatus you have in your own home. This is one of the most intensely interesting scientific toys of today and every boy should have one. Packed in stained hardwood cabinet 18¾ x 10⅞ x 2⅞ inches.

CIVIL ENGINEERING
(SURVEYING)

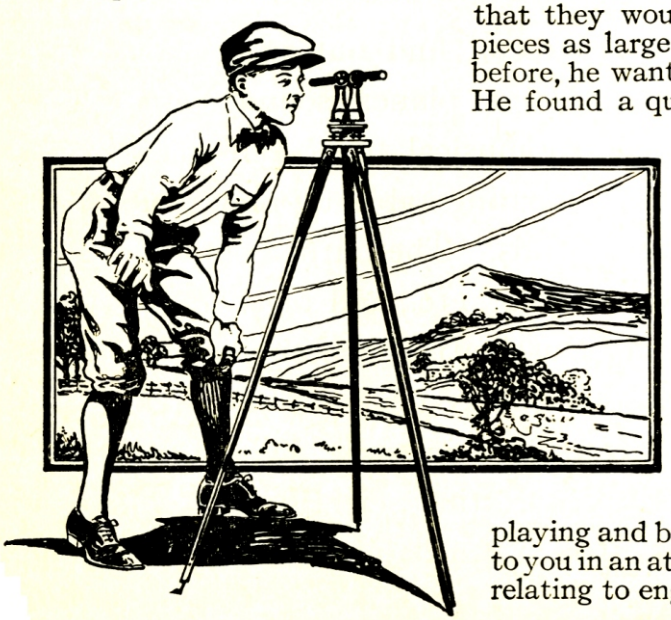
Do you know, boys, that some of our greatest men and most of our great civil engineers who have designed bridges, tunnels, railroads, etc., first learned to survey and make maps? George Washington was a surveyor. He made a very good map of his father's farm in Virginia. Abraham Lincoln was another who learned to survey.

John A. Roebling, designer of the Brooklyn Suspension Bridge, surveyed the line of the Pennsylvania Railroad over the Allegheny Mountains. He was the first man to manufacture wire and wire cables in America, and great factories in Trenton still bear his name.

He designed a number of bridges to carry water pipes across rivers, and in 1851 began the famous Niagara Suspension Bridge, the first railroad suspension bridge in this country. In 1868 he designed the Brooklyn Bridge. While superintending the building of some of the first stonework his foot was crushed, and he died of the injury.

His son, W. A. Roebling, returned from Europe, where he had been studying methods of putting in foundations under compressed air, to take charge of the work. In 1871 he was prostrated with a caisson disease caused by working in compressed air. Determined to finish the work, he hired a house from the windows of which he could see the bridge, and retained full charge until the bridge was completed in 1883.

Captain James B Eads is another of our noted civil engineers. In 1867 he was engaged in building an immense steel arch bridge across the Mississippi at St. Louis. At that time there were no testing machines large enough to crush the most important steel members he was to use in his bridge. He had figured that they would stand the strain, but as no pieces as large as these had ever been used before, he wanted to be safe rather than sorry. He found a quarry which had firm walls of rock, just about wide enough to take one of the steel members. He put it in horizontally with a hydraulic jack at one end, and stressed the steel beam until it gave way. By the pressure on the dial of the jack he knew how many pounds his beam would stand. The bridge was completed in 1874 and is still standing.

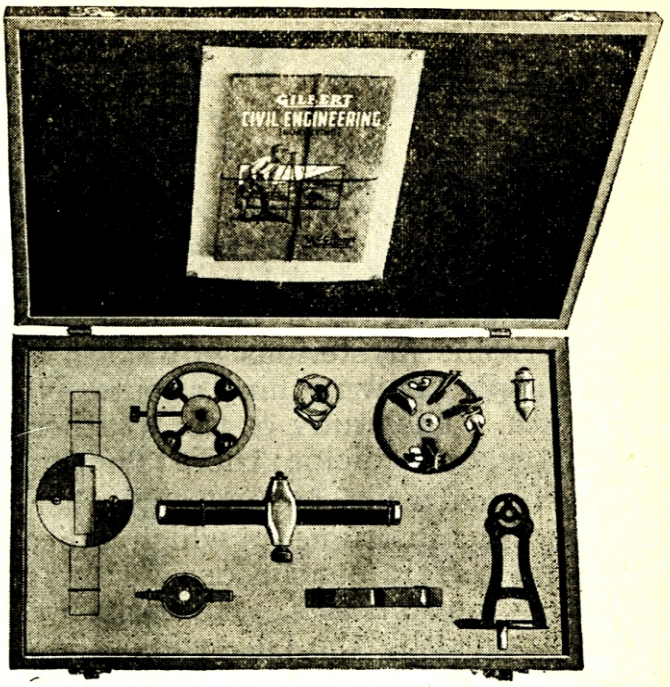


You can learn what surveying is and how to do it by playing and by following the directions given to you in an attractive book in which all words relating to engineering have been simplified.

Gilbert Civil Engineering

(Surveying)

No. 6525



You are very much interested when you are playing baseball or tennis to see that all rules of the games are obeyed. Why not be just as interested about the layout of the baseball field or tennis court?

With the Gilbert Civil Engineering set you will be able to lay out your playing field accurately. With your own instruments you can measure distances exactly, make a map of your backyard, putting in the trees, fences, sheds, etc. You can use your apparatus anywhere—at the camp, perhaps, where it is necessary to get information about the land on which the camp will be located. Find out what the grade of your street is. Learn to lay pipes for drainage. Do many things that the civil engineer does when he is completing a great piece of construction work. All this you do while you are playing.

With an outfit of this kind you are doing something real—something every boy wants to do. The fun you get isn't limited in any way. After you have used your set making surveys you put on paper all information about distances, etc. Then at night when you have a spare moment you can make a complete map. With the set comes a fully illustrated book on surveying from which you can obtain a knowledge of how to use your equipment, how to survey, and of the work great engineers have done. You will be able to talk to your boy friends about surveying in a way that will show them you understand it. The outfit contains all parts necessary for building your own transit—is packed in a stained hardwood cabinet, size, 20 x 12 x 3¾ inches, and weighs approximately 7½ lbs.

HAVE A WEATHER BUREAU OF YOUR OWN

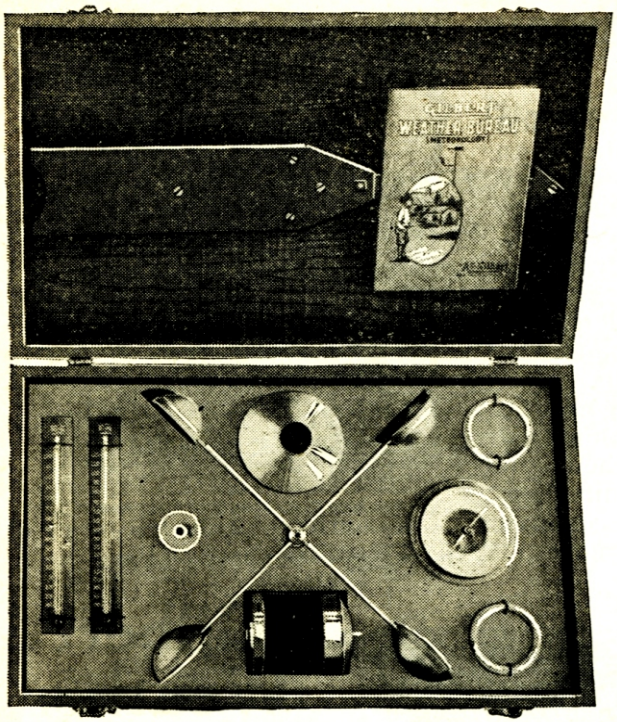
In the minds of most people a very silly idea prevails about the weather and the weather man. It is the general idea that the weather knows no laws—that it is lawless and reckless, fickle and changeable; that the weather man is sort of a conjurer, and by some mysterious gift he is able to prophesy things that most people know nothing about. Nothing could be further from the truth. The study of the weather is a science, like electricity, chemistry, or medicine; there is nothing mysterious about it at all.

As a matter of fact, the weather man is a scientist, and by means of his instruments which indicate definite things to him, he comes to certain conclusions. He is not a prophet; he does not prophesy, he forecasts. He has a weather bureau station which is maintained by the Government. There are over a hundred of these stations located in various cities throughout the United States, and they are very interesting places. They are usually located on the top floor of one of the tallest buildings in the city, with apparatus on the roof, some of it electrically connected in the room below, with wonderful machines which make records all day long on special charts.

If you are interested in having a weather bureau station of your own, I can tell you now that it will be one of the most interesting things you ever had in your life. You will have a knowledge of a subject on which most people are quite ignorant, and if you are a boy you will stand for leadership among boys for knowing about things that to most people are mysterious and magical.

A weather station about your home will give you a source of pleasure and fun and an insight into a science that is intensely interesting, easy to understand, fascinating, and worth while knowing. Read the descriptions of the Gilbert Weather Bureau Outfits on the following pages.

Look over the pictures of the outfits. You'll find them entirely different from any toy you have ever seen.



No. 6531

Gilbert Weather Bureau

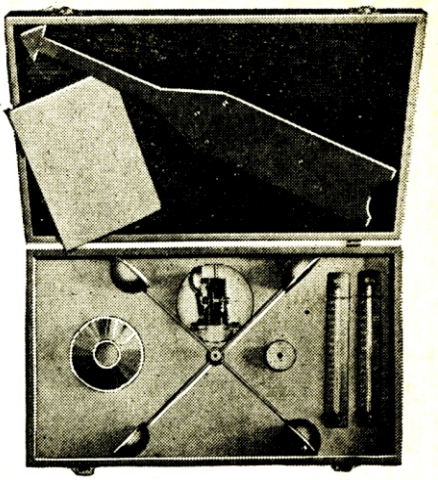
No. 6531

When you see curious-shaped clouds overhead do you know them by name and can you tell what they indicate? People talk about the weather more than anything else, yet they do not seem to be able to speak with authority about it. Winds, changes in temperature, humidity, have a powerful influence in life and they should be understood by everyone. For you and every learner a Gilbert Weather Bureau Set will be a valuable help. It's a new kind of play—made so a real boy can get the most fun in an unusual way. From instruments you set up on your own home you can take readings, and from these make forecasts of the weather. There is a book in each set which tells you how to set up your Weather Bureau Station. It explains the various devices used by the U. S. Weather Bureau to record rainfall, sunshine and wind velocity. In a very simple manner you learn the cause of tornadoes, of floods, the formation of snow, frost, dew and hail.

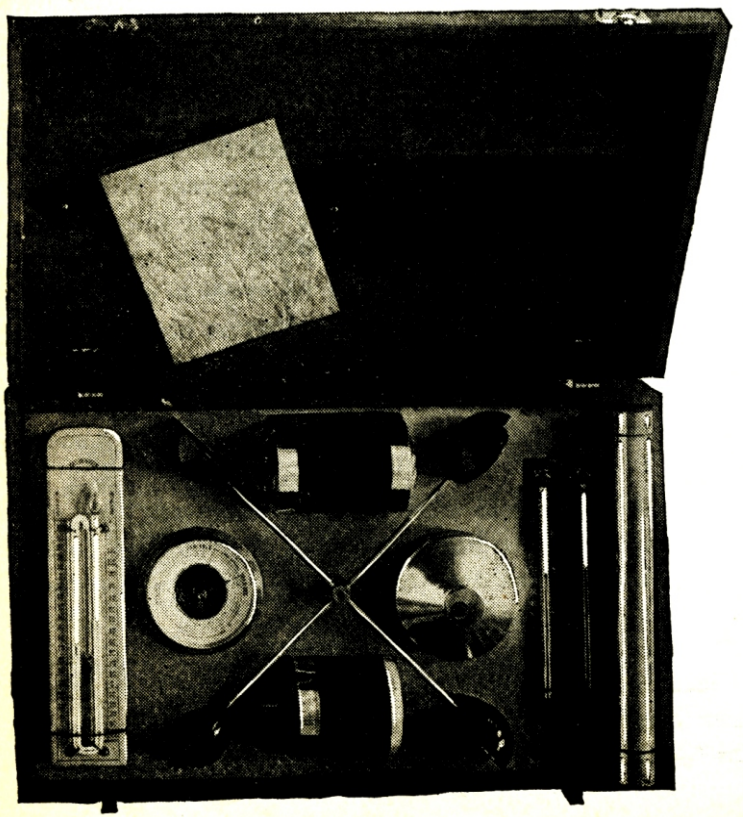
Once you have read the book and made observations with your Set you will see how necessary it is to the farmer to have reports of the weather, to the shipper of perishable goods to know what the temperature will be in certain points and to the big steamships to receive notice of storms at sea. A Gilbert Weather Bureau Set is what you need to make your playing worth while. No. 6531 contains anemometer for measuring the velocity of the wind, thermometers, barometers and all equipment for operating them. The Set is packed in a stained hardwood cabinet, 20 x 12 x 3¼ inches. Weight approximately 7 lbs.

Gilbert Weather Bureau

No. 6530



This outfit enables you to study the first principles of the weather. It contains an anemometer for determining the velocity of the wind, a wind vane for wind direction, as well as thermometers by which you estimate the humidity in the air, etc. The book which is included with the set is written in language that you can easily understand. Every part of this set is strongly made and when set up will operate splendidly. You will enjoy the time you spend making charts. The records that you make can be compared with reports from other sections of the country, and in this way you learn the direction a storm takes in traveling across the continent. The outfit is packed in stained hardwood cabinet 18¾ x 10⅞ x 2⅞ inches. Weight approximately 4 lbs.



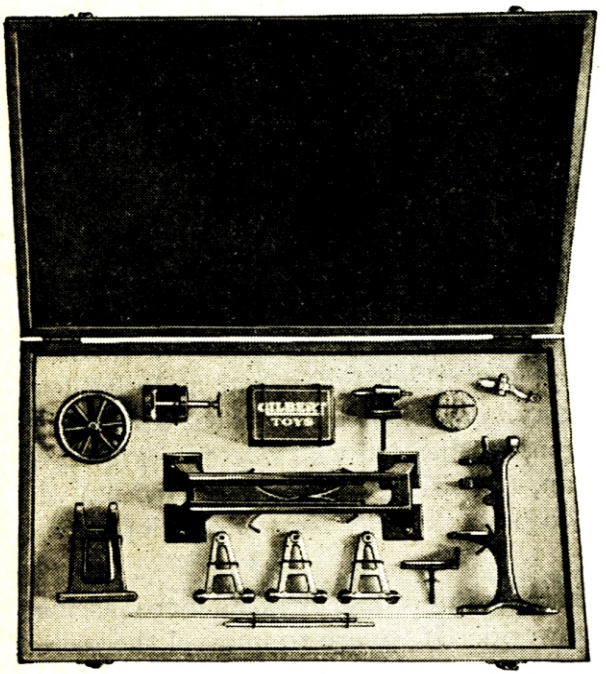
Gilbert Weather Bureau

No. 6532

A very complete weather bureau outfit made to provide you with special intruments. Included in this set is the maximum and minimum thermometer and a sunshine recorder in addition to an anemometer for determining the velocity of the wind, wind vane, etc You will find that this equipment will allow you to compare the records you make with those sent out by the official Weather Bureau stations. This outfit will take all the vague ideas out of your head in regard to the weather. It will show you what an intensely interesting subject the study of the weather really is. Set comes in stained hardwood cabinet 20 x 12 x 3¼ inches. Weight approximately 7¾ lbs.

Gilbert Machine Design

No. 6535



Any boy who has been in a factory and has seen the lathes and drills spin around at a rapid rate, has marvelled at the work that was done on the different machines. You remember how the polishing machine gave a bright finish to the pieces of metal, and what attractive pieces of wood were turned out on a lathe. Wouldn't you like to have an equipment which you could set up in your own home and have it operate just like the big machines do?

Gilbert Machine Design is knocked down machinery, in miniature. If you are interested in mechanics you will be pleased with this set. There will be any amount of fun for you putting axles in place and connecting them with rods. Then when your machine is complete you can make it go exactly in the same way as the big machines do in factories. The parts are made of cast iron with nickel plate finish. You can be sure that your machinery is strongly built and will last a long time.

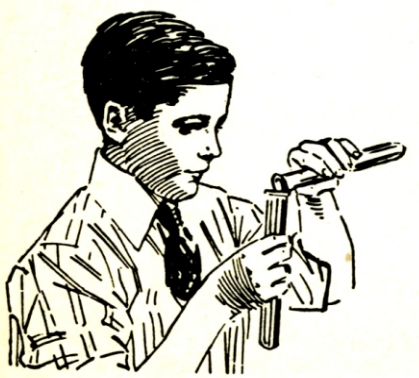
With the set comes a book of instructions which explains the different types of machines and the work each one does. Packed in stained hardwood cabinet, 20 x 12 x 3¼ inches. Weight, 8 pounds.

CHEMISTRY

The word "Chemistry" is supposed to be derived from an Arabic word, "Chema," meaning to hide; hence "the Hidden Science." The origin of chemistry dates back to very early times and is credited to Tubal Cain—the father of workers in metal. Credit is also given to Herman, the Egyptian god of art and sciences. His son is said to have colonized Egypt, which was foremost in the knowledge of chemistry in those ancient days, for they had developed the sciences of making glass, pottery, colors, embalming fluids and other products, to a high degree, and the early Egyptian can really be said, therefore, to have had an advanced knowledge of chemistry. Then Paracelsus, the Greek physician, carried the study along and discovered the influence of chemistry upon medicine in the treatment of human ills, and it was through him that the action of salts upon the human system was first known. Then quite a time elapsed, hundreds of years during which time contributions were made by unknown scientists to the knowledge of chemistry, but which really had little influence upon the development of modern chemistry. It remained for the great Englishmen, Cavendish, who discovered hydrogen, Rutherford who discovered nitrogen, and most important of all the Frenchman, Lavoisier, who is really credited with being the father of modern chemistry, to pave the way for the development of this wonderful science.

There is hardly a science today that is more important or holds more fascinating interest to scientists throughout the world. If we are to unravel the secrets and marvels of our wonderful earth and life there is no science that will enable us to understand these wonderful things of nature that most people think are magical and mysterious, like a knowledge of chemistry.

Very few large industries hope to cope with their competitors without a competent and able chemist to assist them in their development and in the analysis of the things that they buy. The doctor without an insight and knowledge of chemistry would be totally unable to cope with the practice of medicine. During the last great war, the Chemical Warfare Department was as important to the Army and Navy as any other branch of the service.



Get an insight into this wonderful science with a Gilbert Chemistry outfit. Read the descriptions of the sets on the following pages.

GILBERT CHEMISTRY OUTFIT

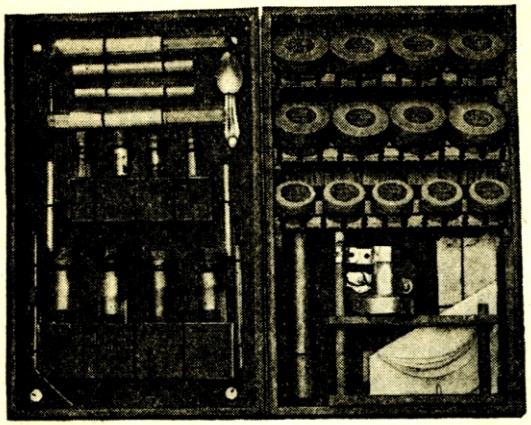
No. 5001

This set on chemistry consists of simple solutions that are entirely harmless. Behind each experiment you do there is an important fact which explains why certain substances exist. In a very easy and simple way you will become familiar with elements that form many things used in everyday life. Nothing ought to interest you so much as making a wet cell battery. This is needed very much to produce electricity for different purposes. The instructions tell you in plain language how to use the material you have. All big names used by the professional chemist are omitted, and you should have no trouble in understanding every direction given. An outfit that pleases and provides you with genuine fun. Packed in special sealed carton, size 12¼ x 8¾ x 1¼ inches. Weight approximately 1 lb.

Gilbert Chemistry Outfit

No. 5003

With the harmless solutions that come in this set you can prepare many substances used in everyday life. Produce startling effects by placing one ingredient with another. Make a wet cell electric battery. When you have completed it you can find out how to electro-plate, which is explained in the book of instructions included with each set. Learn the method of making cloth fire-proof. After you have performed several experiments it will be easy for you to use your chemicals to bring about some amazing results, such as passing an egg through the neck of a bottle and manufacturing a disappearing ink. Aside from getting facts about the composition of articles, you have the material to provide an excellent entertainment for your friends. Packed in the Gilbert sealed carton, 12¼ x 10 x 1¼ inches. Weight approximately 1 pound.



GILBERT
Chemistry Outfit
No. 5004

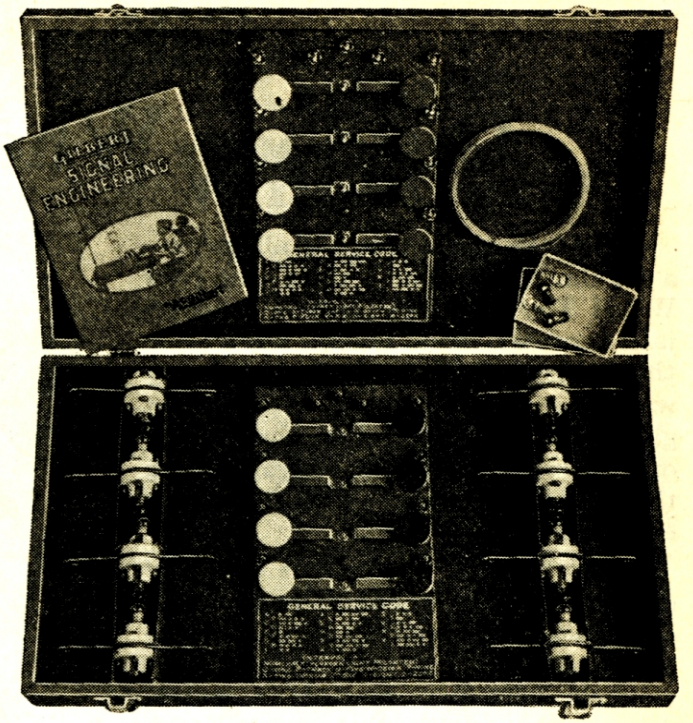
If you know Chemistry, you will know how a great many of the things which are so necessary to your everyday life are manufactured or grown. Chemistry tells you how dye is made for the clothes you wear; what the substance you call "lead" in the pencil you are writing with, really is; how soap is made; how your mother's silverware is plated—and any number of interesting things like that. Wouldn't you like to be able to make ammonia for your mother—or a bar of soap—do chemical magic tricks—or make a wet battery to operate your door bell. You can do these things with my chemistry outfits. Here's a corking chemistry outfit in a hardwood cabinet which is a chemical laboratory in itself. In addition to the many acids and alkalis included, this outfit has a test tube rack, filter paper, alcohol lamp, etc. Book of instructions gives complete directions for the many experiments you can do with this set. Packed in hardwood cabinet, 13 x 8¼ x 3¼ inches. Weight approximately 3 pounds.

GILBERT
Chemistry Outfit
No. 5006

With a set of this size—the largest in the Chemistry outfits—you can learn the elementary facts of this science and make your play both fascinating and beneficial. Doesn't it mean something to you to be able to do electroplating—to make tests of metals? It will be a very easy matter for you to plate old metals, etc., with a finish resembling gold. All this is explained in a book of instructions which covers every detail and is included in each set. There are a great many tricks that you can do with your solutions. With this larger set you can do many of them. There is a valuable knowledge you get in everything you attempt. A description of the manufacture of gas—the methods used in making soap—the elements present in peroxide of hydrogen, and how this is made. Packed in a hardwood cabinet this set is very convenient to carry about. Size, 10 1-8 x 18 1-8 x 2½ inches. Weight 5 pounds.

GILBERT Signal Engineering

No. 6542



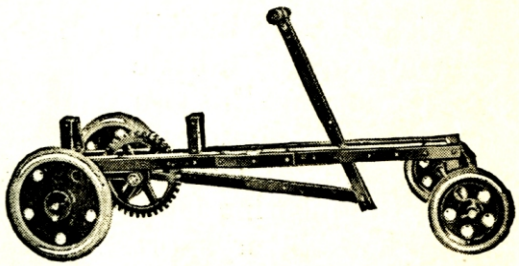
A clear day—a hike in the country, and a little signal practice—this you will certainly enjoy if you have a Gilbert Signal Engineering Outfit. What better sport could you have than that of sending messages by signals, using many different systems?

Gilbert Signal Engineering will teach you how to use the Heliograph, the Wig Wag, Ardois, the Semaphore, and other systems of signalling operated with such great success by the U. S. Army and Navy. Learn about the signals used by ships when out at sea. You will find that many times when out camping or hunting a knowledge of signals will be a great help to you. Suppose some night you and your friends are at camp, you can exchange messages by means of flash-light signals.

The book of instructions which comes in each set explains the use of your equipment and makes it possible for you to thoroughly understand signalling in general. You will learn how communication was carried on thousands of years ago by means of torches and firebrands. The part of the book that ought to interest you very much is that which deals with the building of different kinds of signal apparatus telling you how to make flags, discs, and distaffs to use with the Wig Wag system, a Heliograph to produce sun flashes, and a Semaphore and Blinker arrangement. For real play get a Gilbert Signal Set. It contains two complete sets of electric signals with red and white electric lights together with key-board for operating them. Comes packed in stained hardwood cabinet 18¾ x 10⅞ x 2⅞ inches. Weight approximately 4 lbs.

Gilbert Outdoor Wheel Toy

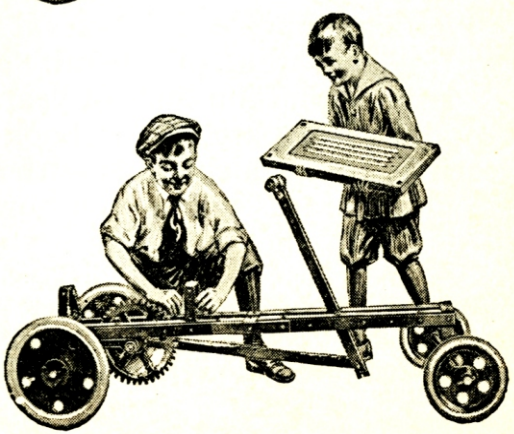
Here's the greatest toy of all, boys—a regular humdinger. With this New Wheel Toy you can make a cracker-jack coaster and many other fine things easy as rolling off a log—a sporty wagon, a dandy geared speedster, a glider that is better than the regular ones, a wheelbarrow, a baggage truck that's the real thing—something new every week.



These toys are not models or flimsy affairs. They are honest-to-goodness ones, exceptionally strong and sturdy—toys that you can get on and ride yourself. All you need is a screw-driver and wrench and the parts in the outfit. With them you can build the glider, wagon, coaster, etc., in no time at all. Think what fun you can have building yourself a different toy every day or every week or as often as you like. There's no end to the sport my New Wheel Toy will give you. Read over carefully the description of each outfit.

You cannot imagine what real fun is until you have learned to build your own coaster and glider and taken a long spin down a hill. You will surely travel fast, and safe.

An outdoor wheel toy means that you will have bully times—that you will get real enjoyment from your play outdoors. Get one of these sets and learn how delightful it is to build your own toys.



Gilbert Wheel Toy

ALL STEEL MODEL

No. 9003

Take a spin on a coaster built by yourself. Go as fast as you like for your coaster is strong and substantial. Built with your own hands from sturdy steel parts you can depend upon it to carry you at a great clip. There is great fun getting the various braces, axles, nuts, wheels, etc., together. You can build a factory truck, two-wheeled wagon, glider, etc., with this set.

A Gilbert Wheel Toy provides plenty of outdoor sport. The beauty of owning a set of this kind is that you can take your glider apart after you have used it and build a two-wheeled wagon or factory truck. This is a new way to enjoy your spare time. Just look at the two special steel disc wheels. They are made of heavy high-grade steel which is stripped out, shaped and formed and then put together with a special locking hub and rivet device that gives them great strength.

The models you make are more than toys, mind you—real things—things that you can actually use and bang around and have great fun with. A screwdriver and a wrench are all that is necessary to make the things shown in the book of instructions which comes with each set. There is included also, angle irons, nuts, screws, axles, bolts, steel plates and wheels. Packed in stained hardwood cabinet 14⅞ x 8⅞ x 2¼ inches. Weight 25¾ lbs.

Gilbert Wheel Toy

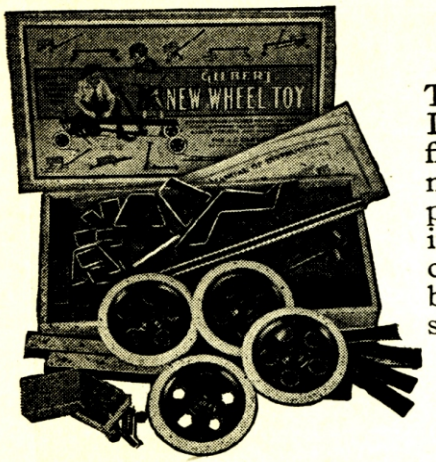
ALL STEEL MODEL

No. 9005

With this larger Gilbert Wheel Toy set you can build larger and more difficult out-door models like the geared speedster, etc. This set contains the special 8-inch disc steel wheels in addition to the small 5-inch size, enabling you to travel faster and easier on the models you build. The speedster, equipped with these big wheels is a crackerjack and beats anything you ever saw for design and speed.

You can be sure of one thing. A Gilbert Wheel Toy builds strong, sturdy, substantial models. Every part is made of the best quality metal insuring you models that will stand long and hard usage. A wrench and a screw driver are the only tools you need to put together all parts in the outfit, and build yourself models which will surprise you in the fun you can have with them. The parts go together very easily, everything is made to fit and the book of instructions tells you in a very easy way just how to construct any model you wish.

The set comes packed in a stained hardwood cabinet on which the seat for your models makes a unique cover, and the cabinet itself makes the body of the wagon model. The parts set in so compactly that you won't think it possible that it contains all the angle irons made of first quality band iron, pinions, nuts, bolts, gears, etc. Size of box 14⅞ x 8⅞ x 3⅝ inches. Weight approximately 30 lbs.



WHEEL TOY No. 9004

With Wood Parts

The first New Wheel Toy Set, boys, and a dandy. It contains all the parts to build the coaster, glider, flat-topped wheelbarrow, flat-topped wagon and many other toys. All parts are put up so compactly in a hardwood cabinet 9½ x 16⅛ x 2½ inches that you scarcely believe it possible that you can build such wonderfully big toys with them. A book of instructions which comes with each outfit shows you just how every model is built.

WHEEL TOY No. 9006

With Wood Parts

The special gears, pinions, axles, etc., which are included in this outfit enable you to build the big-geared speedster in addition to lots of other toys, such as the go-cart, snow-shovel, hobby horse, wagon, wheelbarrow, coaster, glider and a great many more. It comes packed in a sturdy, serviceable, hardwood cabinet 10⅛ x 18⅛ x 2½ inches, and includes a manual giving complete directions for building the toys.

WHEEL TOY No. 9007

With Wood Parts

An even larger outfit than the No. 9006 Set. In addition to the gears, pinions, axles, and many other parts, this set has also a set of sled runners, so that you can build winter toys—bob sleds, wagon sleds, etc. Then, too, there are larger quantities of the standard parts, enabling you to build larger models. Packed in hardwood cabinet 12½ x 20¼ x 3½ inches, with complete book of instructions.

Gee! That's Great!

You simply press a button or turn a switch and you have light. Do you know why—or where it comes from? No! Because its electricity.

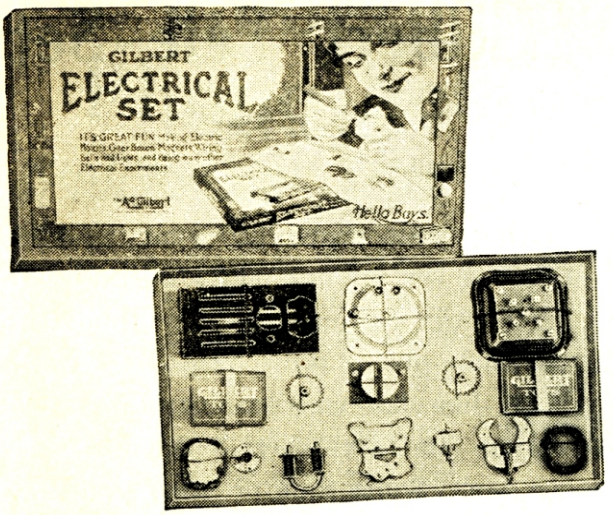
What is electricity? I am sorry to confess, that neither you nor I, nor anybody who lived, or is living, could answer this question. We do not know what electricity is. We cannot define the idea "electricity," but we can turn to advantage the phenomena of electricity. We can, and we do it. We have mastered this mighty force and made it our powerful servant. We can produce it and use it, and are more the servants of electricity than it is our servant. It is hard to imagine what man's life would be without the use of electricity, and I think the time not very far off when the height of civilization will not be measured by soap, but by the electric meter.

While electricity is still a mystery, much is known about the rules and laws governing its nature. Although it is without doubt one and the same, it is for convenience sometimes classified according to its motion, as:

1. Static Electricity, or electricity at rest.
2. Magnetism, or electricity in rotation.
3. Current Electricity, or electricity in motion.
4. Radiant Electricity, or electricity in vibration.

You can learn with Gilbert Electrical Sets why we give one and the same electricity different names and also how every one of the different branches seems to be a special science by itself. But to understand the fundamentals of electricity, to be acquainted with Electrical Engineering, you must start with the first elements and advance step by step.

It is one of the most intensely interesting subjects you ever studied. And fun? Say, boys, you never dreamed of the fun you can have experimenting with it. One of the biggest fields for men today is the electrical field, and the boy who knows about electricity is the boy who will win in life.



Gilbert Electrical Set

No. 3003

Nothing equals the power of electricity in the world to-day. It furnishes us with light and makes trains and trolley cars operate. There are many uses, and you, no doubt, are familiar with some of them by watching the electric appliances you have at home. The Gilbert Electrical set makes your play real. The things you can do with this set will surprise you. Enjoy the fun there is in building a powerful little electric motor—one that will develop surprising power when connected with the gear box included in this set. Learn how to control its speed— how to make it go forward and reverse The boy who owns one of these fascinating and instructive electrical sets will certainly have a big amount of fun, and before he realizes it, he will be known by all his friends as a junior electrical engineer. Packed in new sealed carton, 18 x 10 x1¼ inches. Weight approximately 3 lbs

Gilbert Electrical Set

No. 3004

For an elementary knowledge of electricity this set is what you need. You will learn to construct a motor that will furnish you with power to operate anything you make. This little electrical laboratory will teach you the fundamental laws of gears and electric machinery. The set contains a model for an electrical sounder enabling you to study and exercise practical telegraphy. By playing with an equipment like this you will be able to understand the dynamo or the generator, the big apparatus used to produce electricity, and many other wonderful electrical things. With each set is a big book of instructions telling you how to perform each experiment. Packed in a hardwood cabinet, 13 x 9 x 3. Weight approximately 3 lbs.

Gilbert Tele-Set

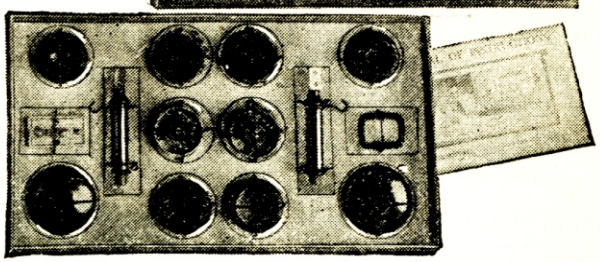
No. 3502

Get your boy friend to help you string your wires for your Tele-Set. Get it set up and start operating it. An outfit you can use any time with a whole pile of fun. This outfit works just like the instruments in the telegraph stations where communications between distant points take place every day. Some time or other you have wanted to put up a telegraph set that was real and practicable and one that you could use with your chum. You were unable perhaps to get the right kind of instructions and you did not care to spend a large amount of money to get material and then find that it was too difficult to set up your equipment. Here's just the outfit you want.

In the book of instructions included with the set everything is explained very simply so that it will be easy for you to understand how every part works. You won't be discouraged when you start to work with this set because the apparatus has been prepared especially for your use. Think what fun it would be for you to go to your telegraph set and call your friend who lives a few houses away from you. He can answer your call and then you are ready to send your message. After you have used your set and know the code, it will be very interesting for you when in a telegraph office to listen to the instruments they have there. It is well, too, that you become familiar with the code used in Wireless. Then you will be in a position to understand the transmission of messages by this system as well as by telegraphy. This is the game for you—the kind of play that gives you plenty of fun and at the same time teaches you things every boy is eager to know. The best part of a set like this is that you can use it any time—day or night. Get a Gilbert Tele-Set and have good times. Packed in Gilbert Toy sealed carton 12⅛ x 8⅜ x 2 inches. Weight approximately 1 lb.

Gilbert Phono-Sets

Real Working Telephones



No. 3503

Say, boys, here's new electrical sets that are dandies. Real telephone outfits that you can rig up from your house to the house of your chum and talk to him any time you want to. You can have some corking good times. On rainy days, for instance, you can talk to him as much as you want to. Your folks can use them, too. You will have your own private telephone system with no telephone operators to bother you or listen to what you are saying.

You can rig them up from kitchen to parlor and talk to your brother or your sister, or play that your sister is the lady of the house, who is ordering things from you over the 'phone, and you are the butcher or the grocer. You sure can use it in lots of ways and have a pile of fun with them.

No. 3504

No. 3503 Outfit. Contains two complete telephone stations, with 'phones already to be assembled, wire and complete book of instructions. Packed in Gilbert Toy sealed carton, size 18 x 10 x 1¼ inches.

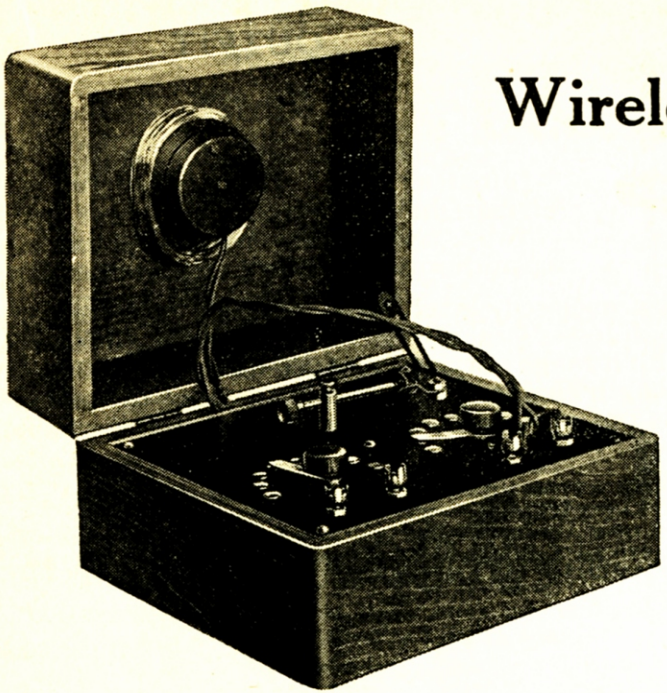
No. 3504 Outfit. Two complete telephone stations, same as in No. 3503, and also fitted with bell call system so you can ring up your chum or whoever has the other station. Complete book of instructions also included. Packed in stained hardwood cabinet, size 18¾ x 10⅞ x 2⅞ inches.

Have Your Own
RADIO STATION

Boys, you don't know what you are missing without a Wireless station. You are losing more fun and more pleasure than you think. It's great, I can tell you, to have an apparatus and receive the messages that are sent out from Wireless stations all over the country. There are a great many boys anxious to learn radio, and you'd be surprised at the number who have already installed equipments in their homes and are enjoying the work that can be done with Wireless. They seem to realize very much the importance of this method of communication to the world today, and are eager to get all the information they can so as to understand thoroughly the wonderful improvements that have been made in the equipment necessary to send and receive Wireless messages.

Have you ever been in a Wireless station when a message has been either sent or received and listened to the buzzing of the instruments? It's really wonderful. Doesn't it seem marvelous to you that the operator can sit at his instruments and by simply ticking a telegraph key, send a message many miles over the country. Or, perhaps, receive a message from half way around the world. Think of it, boys, that message doesn't travel on wires or anything we can see, it just goes out on the air and is picked up by another Wireless station miles away.

Get in on this great new science. Enjoy yourself by securing a radio outfit and establishing a station of your own. It's easy—and you're sure to be enthusiastic about it. Read the description of the Gilbert Wireless Station in operation at the factory in New Haven. If you live within range of it and have your own station you can receive the reports sent out by the operator every day. This is a big help to you in beginning your work with Wireless for the messages are sent out at slow speed, first, so that you can learn the code, and then at faster speed. If you do not live within range of it there are big stations scattered all over the country so that Wireless signals can be heard everywhere. Put a Wireless station in your home and you'll soon see how valuable it will be to you.



Gilbert Wireless Receiving Outfit

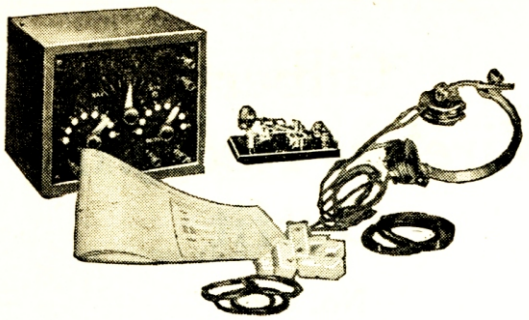
No. 4006

Think of it, boys, a complete wireless receiving equipment put up in a hardwood cabinet only 6¾ x 7¾ x 5½ inches when closed. It does not seem possible, does it? This outfit is going to make wireless receiving a great deal more attractive to many boys. Today, most boys think that they can't afford to take it up—that it costs too much. Not so with this set. A wireless station is now within the reach of every boy—for who can't soon earn the small amount this set costs.

It's complete in every way, boys, containing a special loose coupler, mineral detector and one head phone. All arranged very compactly in a stained hardwood cabinet. With each set comes a big book on Wireless, telling just how to rig up your station and how to operate it. The code is given so you can very easily learn what the signals you receive mean. There is also a list of wireless stations all over the country, and by referring to this you will know what stations to listen for.

Wireless operating is the most fascinating thing you ever tried and it opens up a tremendous field for ambitious boys. It's an entirely new science in which great men are experimenting every day. Who knows but what some day you may be just as famous. It's the boy who follows up his advantages that makes a name for himself.

Get one of these 4006 Wireless Outfits and get in on the most interesting science of today.



RADIO RECEIVING OUTFIT

No. 4007

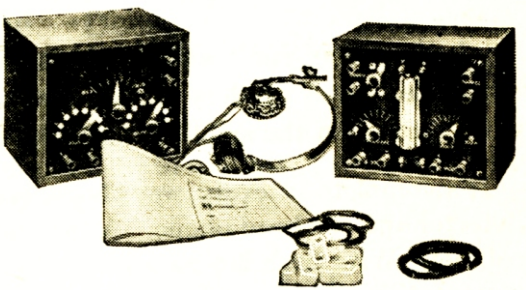
A complete receiving station for amateur work. It contains loose coupler, mineral detector, insulators, aerial wire, connecting wire, phones, and authoritative book on radio operating.

The Loose Coupler is the new enclosed panel type, designed with extreme care to eliminate all "dead end losses" in the secondary. It is an exceedingly efficient tuning system, with a range varying from 200 meter to 2500 meter stations. This range of wave length enables you to receive most of the stations operating in this country. It is put up in a polished golden-oak finish cabinet, size 6¾ x 7¾ x 5½ inches.

The telephone receivers are the 2000-ohm type, with adjustable head band and six-foot cord. Insulators and sufficient aerial wire have been included so you can erect an antenna of the proper dimensions. An authoritative book on radio is also included which you will find valuable as a reference book. Not only does it give complete directions for the erection and operation of the No. 4007 outfit, but also lists the radio stations of the country, when they send, their wave length, how to receive them, etc.

RADIO RECEIVING OUTFIT

No. 4008



This radio receiving station is exactly the same as our No. 4007 Outfit, except that the audion detector is used instead of the mineral detector. This change greatly increases the range of the station and makes it an extremely sensitive outfit. The audion detector and amplifying device produces much louder signals than the crystal detector and is designed particularly for the critical operator who insists upon loud, clear signals. In this outfit are the standard Gilbert Loose Coupler and the 2000-ohm phones. Both the loose coupler and audion are put up in the special golden-oak finish, polished cabinets, 6¾ x 7¾ x 5½ inches.

The book of instructions included with the outfit is an authoritative book on radio and is a valuable reference. It gives complete instructions for the operation of the outfit and also a list of the radio stations of the country, when they send, their wave lengths, how to receive them, etc.

This outfit has a receiving range under average conditions of 1000 miles. It provides a station of the most modern apparatus; highly sensitive and of most exacting radio design.

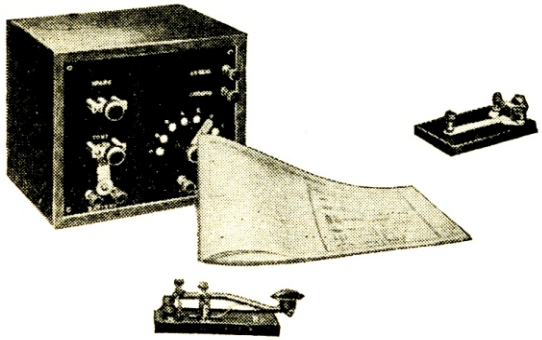
RADIO PARTS SET

No. 4009

This Radio Parts Set is an entirely new departure in the radio field. It consists of a complete set of parts and materials for building a receiving station, with a range of 300 miles. It is designed particularly for the amateur who wishes to construct his own stations—who wants to know his outfit from the bottom right through. The only way this is possible is to put every part together—do your own winding, and, in fact, do everything that enters into the make-up of your station.

It comes knocked down in a compact, stained wood cabinet. You can build a loose coupler very similar to the standard Gilbert Loose Coupler furnished with all our high-priced Radio Outfits. All parts are in the set including coil forms, switch points, knob, switch levers, binding posts, machine screws, wire, insulators, etc. Also parts for a crystal detector with a moulded base as well as insulators and aerial wire.

This station will have a range of approximately 300 miles under average conditions. The outfit is packed complete in a compact hard-wood chest, size 10 x 17 x 2¾ inches.



TRANSMITTING OUTFIT

No. 4010

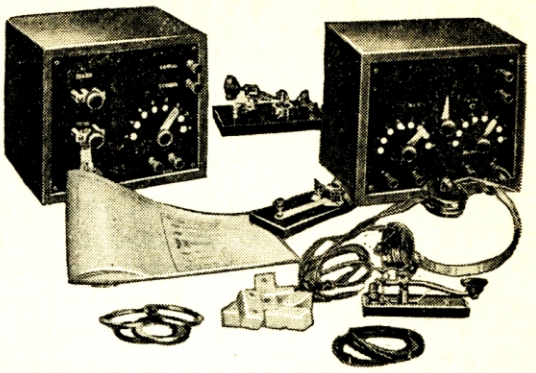
A Gilbert Transmitting Outfit that is entirely complete in itself. It does away with the trouble you have had buying separate parts. All the apparatus is complete, and has several new mechanical and electrical features that are great improvements over previous designs.

The present Government Radio regulations permit your using wave lengths of 200 meters. It has always been difficult for the average amateur to comply with these regulations, but all this has been overcome in the Gilbert Transmitter as the wave length of 200 meters has been fixed and is the maximum wave length which the set will permit. It is extremely simple to operate, as there are only three adjustments to make. The set is essentially the spark coil type and has a range of approximately 3 to 5 miles under average conditions.

The outfit includes transmitting cabinet, key aerial switch and complete book of instructions. Transmitting cabinet is 6¾ x 7¾ x 5½ inches, finished in golden oak. The set throughout is the latest and most improved type of transmitting apparatus. A book of instructions is included, giving complete directions for the assembly and operation of the outfit.

RECEIVING AND SENDING STATION

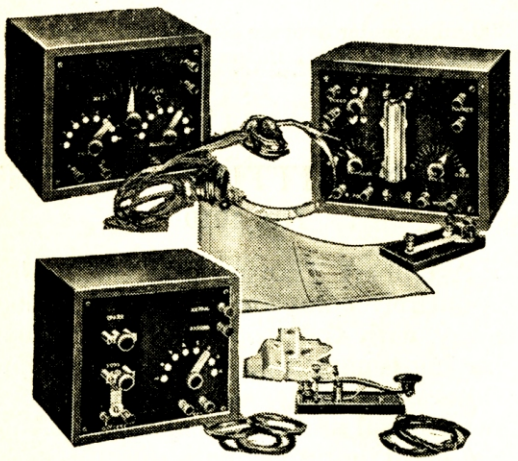
No. 4011



A complete radio station, with all equipment for transmitting as well as receiving messages. It is a combination of our No. 4007 Receiving Outfit and No. 4010 Sending Set, providing you with receiving equipment with a range of 300 miles, and transmitting apparatus enabling you to send messages from 3 to 5 miles. It complies with all Government regulations in every way and at the same time provides every essential part for a radio station of the most up-to-date type.

The new enclosed panel type Loose Coupler is included. This is the same Loose Coupler that is included in all Gilbert Receiving Outfits. The telephones are the 2,000-ohm type, with adjustable head band and 6 feet of cord. The switch and key are mounted on heavy moulded bases; binding post and lever knobs are fitted with brass bushings. The sending cabinet is the standard Gilbert Transmitting Cabinet, with fixed wave length of 200 meters. The necessary wire, insulators, etc., are also included.

With each outfit comes the complete reference book on Radio, giving detailed directions for assembling and operating.



RECEIVING AND SENDING STATION

No. 4012

A super-radio equipment that is all that its name implies. This outfit gives you a receiving range that enables you to receive signals almost any time during the day or night. It will receive most of the stations transmitting the press reports, weather reports, and time signals.

Made up of our No. 4008 Radio Receiving and No. 4010 Transmitting Set, it provides you with Loose Coupler, Audion Detector, Sending Cabinet, Switch, Key, Telephones, Insulators, Wire and Reference Book on Radio; complete materials for a highly sensitive radio station. It is the most complete station we provide for amateurs and the one we strongly recommend.

The apparatus is exactly the same as put out in all Gilbert Radio Outfits: Sending Cabinet, Audion and Loose Coupler are all made standard size, 6¾ x 7¾ x 5½ inches, in polished golden oak finished cabinets. The phones are the standard 2000-ohm type with head band and 6 feet of cord. The switch and key have the regular moulded bases. All fittings throughout are the latest type; binding posts and lever knobs of moulded composition with brass bushings. The book on radio included gives complete directions for assembling and operating the set and also lists the government stations, when they send, how to receive them, etc.

The outfit has a receiving range of 1,000 miles and will transmit messages from 3 to 5 miles, complying with government regulations in every way.

GILBERT RADIO PRESS

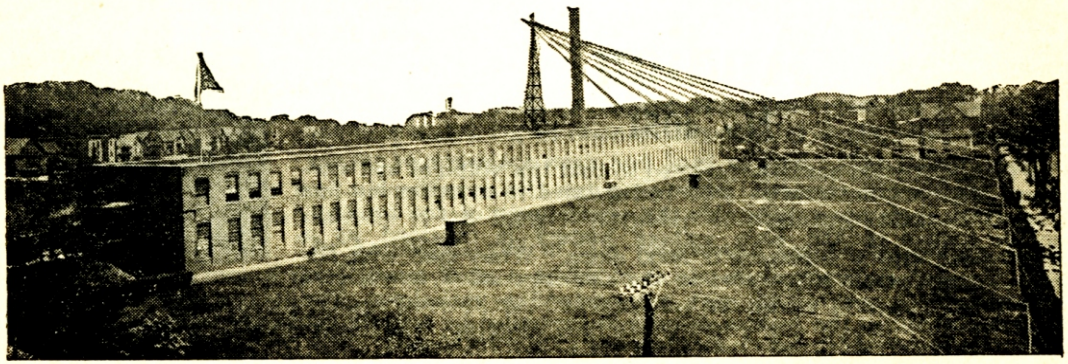
Transmits Daily to Amateurs

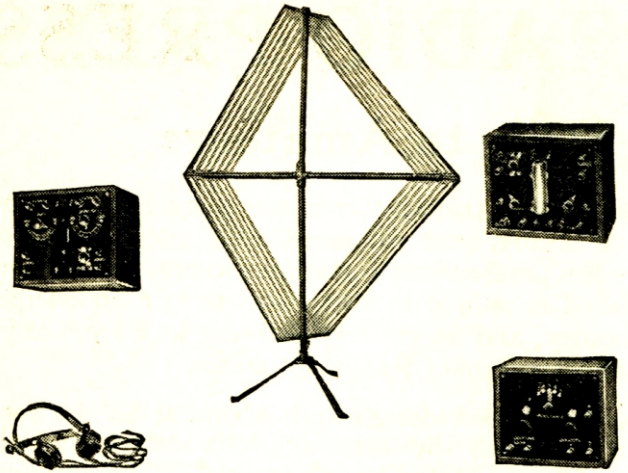
We have established a high-powered radio transmitter in our plant here in New Haven under special Government license, and will send daily press messages and matters of general interest to the amateur radio station owners of the country. The plant we have established is unique in itself, and to our knowledge the only one of its kind in the country, and an entirely different idea from anything ever attempted by other manufacturers of Radio Apparatus.

The transmitting plant is of the very latest design and is similar to the sets installed for the Navy Department. With the large umbrella antenna which is 125 feet high, an average range of over 1,000 miles is expected. The antenna has been arranged so that the station will direct most of its energy toward the West, and it is believed that it will include within its range most of the territory east of the Mississippi River and north of Tennessee and North Carolina.

The operator in charge of the Gilbert Station will transmit the daily news twice every day, except Saturday and Sunday. The first bulletin starts at 4 P.M. Eastern Time, with five-minute periods, with ten-minute intervals between these periods. The second bulletin starts at 7 P.M. Eastern Time, and is sent in the same way. The news sent out will be a summary of the daily events and such matters as might be of interest to the amateurs of the country. Each of the periods will be used to transmit at different speeds. This will give the beginner, as well as the experienced operator, an opportunity to copy the press bulletins. It is probable that speeds of 8, 10 and 15 words per minute will be maintained. The variation of speed will be very beneficial to the beginner who is working up his operating ability.

If you are in the range of this station and have a wireless outfit, you surely want to listen in.



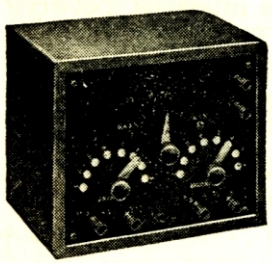


Loop Outfit

No. 4013

It is only necessary to set up the Loop Antenna. connect the Loop Tuner and Detector and you have a complete receiving station that you can use anywhere—on the ground—inside a house—from your machine, in fact, it has been found to operate from practically any place. This outfit makes it possible for you to have a receiving station with a range of approximately 300 miles when it is impossible for you to erect a standard antenna.

The outfit comes complete with the Gilbert Loop Tuner, Vacuum Tube Detector, Vacuum Tube Amplifier, Head Phones and Loop Antenna put up in the standard polished quartered oak cabinets, 6¾ x 7¾ x 5½ inches. It is an outfit we recommend highly for house use, where it is not convenient or you do not wish to go to the expense of erecting an aerial. It is designed to receive wave lengths from 200 meters up to 2500 meters and has a range of approximately 300 miles.



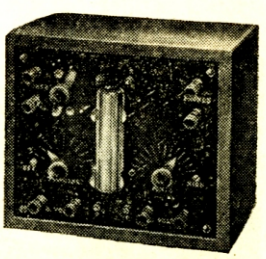
Loose Coupler

No. 4050

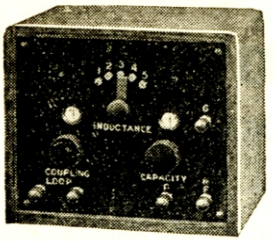
Not the old obsolete type of Loose Coupler that pulls out of the box, but a new enclosed panel type which is a distinct Gilbert invention. All the "Dead End" losses and undesirable effects from distributive capacity, which bring down the efficiency of the average Loose Coupler, have been eliminated by a special method of winding. Designed with the greatest care this Loose Coupler will receive all the average station wave lengths as well as the 600-meter length of ship stations, the 1000-meter length of the navy station and the 2500-meter length of Arlington. The case is hardwood with a golden oak finish, size 6¾ x 7¾ x 5½ inches.

Audion

No. 4051



The Gilbert Audion has been designed so that the voltages and currents of the various batteries may be regulated to an extremely fine degree which increases considerably the sensitiveness of the detector. Accurate control of the high voltage battery is obtained by a potentiometer with a resistance of 8000 ohms. When used with the 45-volt battery, which is included in the Gilbert Audion, it will give any voltage from zero to 45, with extremely fine variations. The Filiament current for the Audion detector is controlled by a finely graduated rheostat. It is put up in the beautiful golden oak cabinet, size 6¾ x 7¾ x 5½ inches.



LOOP TUNER

No. 4064

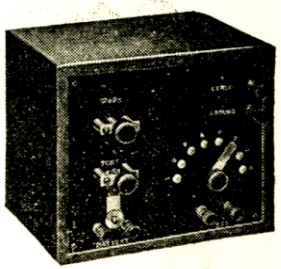
The Gilbert Loop Tuner is a special tuning device that has been designed particularly for use with the Gilbert Loop and Vacuum Tube Detector The tuning of a Loop is extremely important, and all the fine details have received full consideration in the careful designing of this tuner. It is used to vary the wave length of the loop from 200 to 2500 meters and consists of a loading inductance, "feed-back circuit" and variable condenser for tuning. The signals received on it are exceedingly sharp and are greatly amplified by means of the "feed-back" device.

While designed for use with the Loop and Vacuum Tube Detector, it may also be used with great efficiency with an antenna and audion detector.

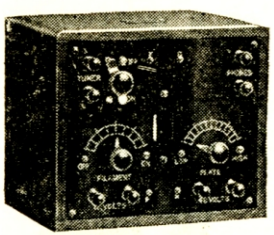
It is put up in a standard polished quartered oak cabinet, 6¾ x 7¾ x 5½ inches, and matches all of the other Gilbert Radio apparatus.

Sending Cabinet

No. 4052



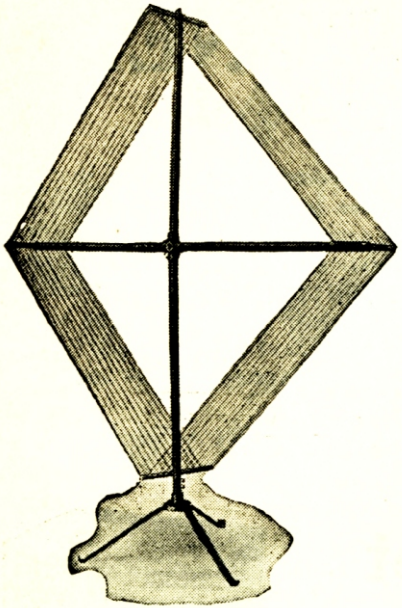
A new departure in the amateur radio field was made with the introduction of the Gilbert Sending Cabinet. It automatically does away with any difficulty you have had in complying with Government regulations. The 200-meter wave length which the Government permits amateur stations to use is no longer an uncertainty, as the Gilbert Sending Cabinet has a definitely established primary wave length of 200 meters. Means have been provided to send the waves out with antennae of varying lengths. This is controlled by an 8-point switch in the cabinet, and is one of the adjustments which the operator makes when he first gets the set. Cabinet is polished oak, size 6¾ x 7¾ x 5½ inches and has the same beautiful golden oak finish that is used on all Gilbert Apparatus.



AMPLIFIER

No. 4066

An Amplifier is almost indispensable when operating a Loop Outfit, but it is also a big addition to any type of outfit when the signals you are receiving are weak and hard to hear. The Gilbert Amplifier is the Audion Frequency type and will work with any radio outfit. It increases the signal strength from 5 to 25 times. The make-up of the Gilbert Amplifier is distinctly different from the conventional amplifiers. The Amplifying coil in this instrument has an impedance equal to the output impedance of the Vacuum Tube, resulting in an extremely efficient instrument. Used with the connections in the Gilbert Loop Outfit, this Amplifier has hardly an equal. It is put up in the standard polished hardwood cabinets, size 6¾ x 7¾ x 5½ inches.



Loop Antenna

No. 4063

The Loop Antenna used with Gilbert Radio Apparatus has been designed to receive wave lengths from 200 meters up to 2500 meters, and when connected to the Gilbert Loop Tuner, Vacuum Tube Detector and Amplifier, it has a range of approximately 300 miles. It will operate on the ground—in a house—practically anywhere. One of its chief values is to provide a means of radio receiving where the erection of an antenna is impossible, as in a garage, farm or house. It might be called the inside antenna.

It comes knocked down with all the necessary wire for winding, and assembles easily and quickly.

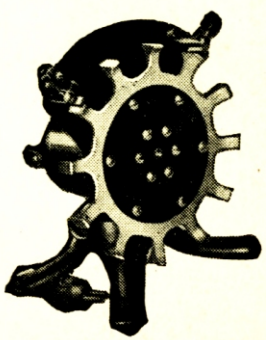
Rotary Spark Gap

No.4060

The Gilbert Rotary Spark Gap, with its 12 electrodes and a speed of 4000 R. P. M. gives a clear, musical note, and has proper quenching and great radiation qualities. It is extremely well built and operates on a quiet-running 110-volt universal motor.

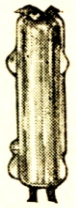
The Rotor element is a cast zinc alloy wheel which is machined to balance and give freedom from vibration. The fixed electrodes are also made of zinc and can be closely adjusted to the moving points. The insulation throughout is sufficient to stand 10,000 to 15,000 volts.

The construction is extremely novel since the whole gap is fastened to the motor housing and shaft, thus doing away with an insulated base and the accompanying drawbacks.



Vacuum Tube

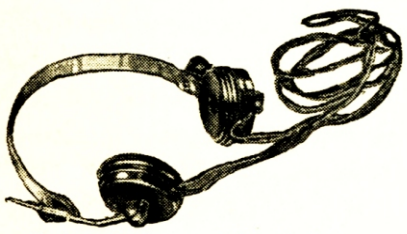
No. 4062



With the restricted wave-length and comparatively small antenna current that amateur stations are allowed, a vacuum tube with its amplifying properties is an essential. The Vacuum Tube used in all Gilbert outfits gives excellent results, and with proper care will have a very long life. It will operate efficiently over a wide range of voltages.

Phones

No. 4055

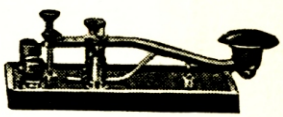


The Gilbert Phones are the 2,000-ohm type, with head-band, receivers and cord. These telephone receivers are specially constructed for radio work and are extremely sensitive. Part of the sensitiveness of this head phone set is due to the special magnet steel which we use in the permanent magnets and to the fine grade of soft iron which makes up the pole pieces. The diaphragms are carefully selected stock and are only .006 inches thick. The shell is aluminum and the earpieces of insulating composition.

Key

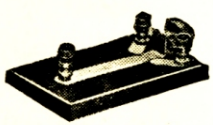
No. 4057

A snap key which can be used with wireless transmitters where a comparatively low power is handled. This key is not recommended to handle large amount of power. The base of the key is moulded composition, very attractive and extremely serviceable.



Aerial Switch

No. 4056

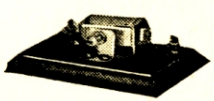


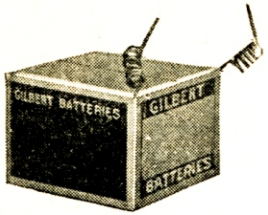
An aerial switch is used to transfer the aerial lead from the sending to receiving or vice versa. The Gilbert Aerial Switch accomplishes this in a very short throw which gives the operator the quick control which is desired in changing from transmitting to receiving. This switch will operate where the transmitting voltage is not over 20,000.

Buzzer

No. 4058

The adjustments of a crystal detector are greatly facilitated by the use of a small buzzer. This Gilbert buzzer is extremely efficient and will be found a big assistance. Mounted on black moulded composition base.





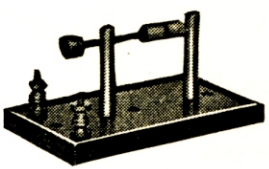
Batteries

No. 4059

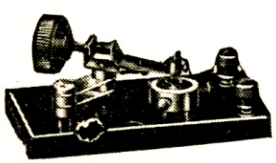
High voltage batteries which have been constructed for use with the Gilbert Audion. It is a long life battery and will considerably outlast the small flashlight type. Its voltage is .45 and the positive and negative terminal is clearly marked. These batteries are a regular part of the Gilbert Audion, No. 4051.

Fixed Spark Gap

No. 4061



A fixed spark gap to be used with spark coil transmitters. The gap has been rigidly constructed, binding posts and gap of lacquered brass mounted on black moulded composition base.



Crystal Detector

No. 4054

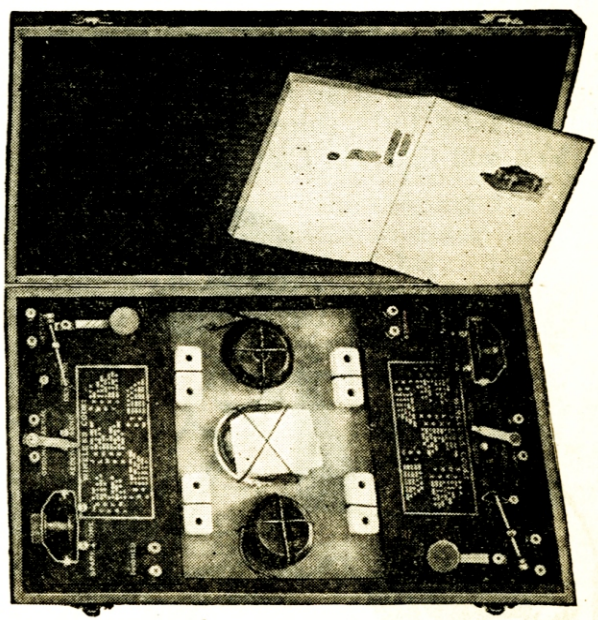
A crystal detector of the adjustable type mounted on a moulded composition base. This detector is rugged in construction and is arranged so that the fine wire may be readily moved over the surface of the crystal. Once the adjustment is made this detector is rigid enough so that it will withstand ordinary shocks without losing its adjustment. Means is provided for the interchanging of different minerals.

No. 4004

WIRELESS TELEGRAPH OUTFITS

Most of you boys know how valuable the science of wireless telegraphy has become in the last few years. Nowadays it's nothing for a ship way out to sea to send a message to land or to another ship. What an improvement that is over the old days when it was only possible to send messages in the slow way of flag signalling, called wig-wagging. And then they could only be sent a very short distance. Only as far as it was possible to see through a telescope. Wireless telegraphy has changed all this. For instance, if some man whom the police are after escapes on board a ship and gets half way across the ocean, they simply send a wireless message which is relayed from ship to ship until it gets to the right one, and the man is caught before the ship lands in a foreign port.

I knew many of my boy friends would like to know more about this wonderful science, so I made these Wireless Telegraph Sets. The Manual which is included will teach you the first steps in Wireless. How to rig up your outfit, all about the code, etc.



No. 4005

No. 4004 Outfit—Contains one receiving and one sending station, receiver, wire, cleats, and book of instructions. Packed in the Gilbert Toy sealed carton, 18 x 10 x 1¼ inches.

No. 4005 Outfit—Contains two complete receiving and sending stations, together with receiver for both stations, wire, cleats, and big book of instructions. Packed in stained hardwood cabinet 19 x 11 x 3 inches.

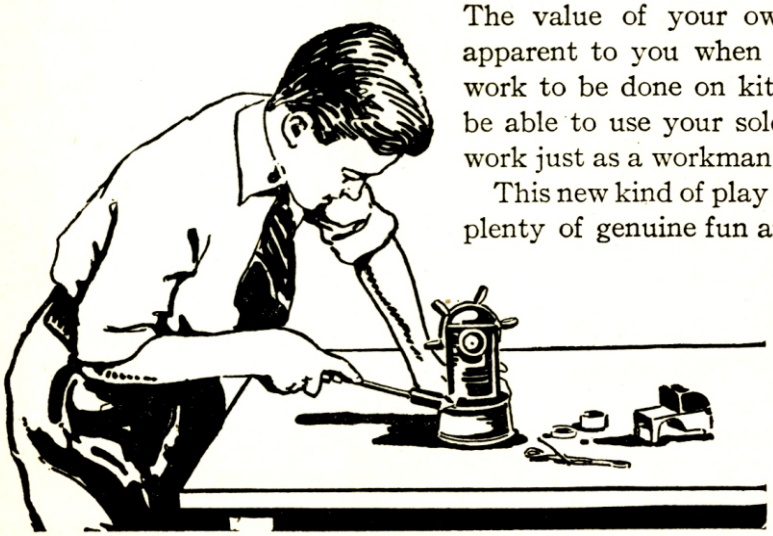
The Original

Tin Can Toy Making

For long, people have regarded tin cans as worthless—without value of any kind. Empty tins have been looked upon as a nuisance and rather than have them gather about the house they were thrown away. The invention of Tin Can Toy Making has changed this idea and makes it possible for you and every boy to use tin cans with benefit to yourself and to others. Mr. Thatcher, the originator of Tin Can Toy Making, has taught boys, and during the war, wounded soldiers, the methods of putting tin together so as to make articles for the home and novelties and toys.

There are many styles of tin cans come into your home—such as cocoa, tobacco and olive oil cans. These are clean and in a shape that requires little fixing to make excellent models. It is very interesting to know how different cans, small and large, are used for a particular purpose. In the construction of a power wheel a flat salmon can is used for a base, a tobacco can for supports, the lids of small-sized cans for wheels, and the caps from soda bottles as paddles. In some things you make it will be necessary to cut tins. Now just as it is important to know what type can you should use for your model, it is equally important that you know how to use the shears, forming blocks, folder, etc., which are used in Tin Can Toy Making. This knowledge you will get clearly from the book of instructions. In the beginning it is best that you start on the small articles, like the ash tray or the biscuit cutter. When you have learned to use your tools carefully you will be in a position to attempt difficult work, such as building automobiles, forts, ships, aeroplanes, weather-vanes, etc.

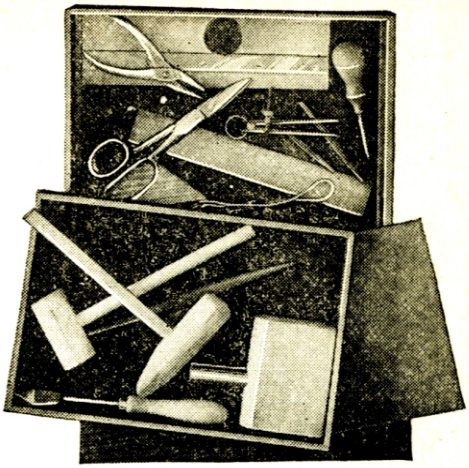
You will find Tin Can Toy Making very amusing and an excellent pastime. The value of your own workshop will be apparent to you when there is some repair work to be done on kitchenware. You will be able to use your soldering iron to do this work just as a workman would do.



This new kind of play will provide you with plenty of genuine fun and will please you in every way. You will have the satisfaction of showing others that tin cans should not be considered as rubbish, but should be used for a good purpose.

Tin Can Toy

No. 7050



No. 7050

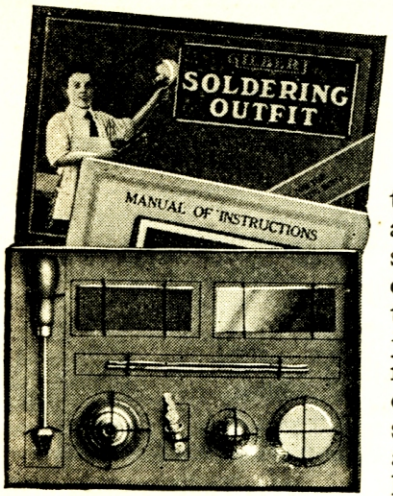
The idea of making toys and handy articles from tin cans seems queer because you have always looked upon them as worthless. You cannot realize what interesting models will result from a little work on cans. Automobiles, power boats, tug boats and numerous other toys can be made. You can make, too, handy articles for the house, such as ash trays, biscuit cutters, etc. The set contains a complete soldering outfit, mallet, soldering iron, shears, and forming blocks. You can use your equipment to make repairs of kitchenware also. You will have the same amount of fun using this set as the wounded soldiers had during the war, when they made many pleasing articles. They enjoyed Tin Can Toy making, and you will, too, when you have read the book of instructions that comes in every set. You will learn how simple it is to use your various tools for different purposes. Packed in stained hardwood cabinet with tray. Dimensions, 12⅜ x 8¾ x 3⅛ inches. Weight approximately 4 pounds.

No. 7051

Tin Can Toy

No. 7051

This outfit, with No. 7050, are the only toys of the kind on the market—the original Tin Can Toy making invented by Mr. Edward Thatcher. The boy who wants a complete outfit will be interested in this, as it contains full-size tools, such as a boy needs to make big models. A book containing many illustrations and detailed instructions for making toys was prepared by Mr. Thatcher, the inventor. Comes packed in stained hardwood cabinet fitted with iron hinges and suitcase catches. Dimensions, 10¼ x 16⅞ x 2⅞ inches. Weight, approximately 5 pounds.



No. 7001

GILBERT
SOLDERING OUTFITS

These new soldering outfits are really more than toys. They are mighty handy things to have around the house if any of your mother's pans or small kettles spring a leak. With one of these outfits on hand you can quickly and easily repair them. There's any number of useful household jobs you can take care of as well as perform many novel and interesting experiments. With each set comes a book of instructions telling all about soft soldering and hard soldering, heating methods, etc., as well as giving complete directions for soldering hinges, joining sheets of metal, soldering chain, soldering a crack in a pipe, enamelware, galvanized iron, etc.

You can do real soldering with these sets, not only for your mothers, but for other folks living near you. Any work you do for anybody outside your family you can charge for and in that way make quite a little extra spending money.

Soldering Outfit
No. 7001

This outfit contains soldering iron, solder, lamp, flux, sheets of metal and complete book on soldering. Packed in the distinctive Gilbert Toy sealed carton. Size 12¼ x 8¾ x 1¼ inches. Weight approximately 1 lb.

Soldering Outfit
No. 7002

This outfit contains a dandy little oven which can be used with gas or regular lamp, in addition to soldering iron, solder, lamp, flux, sheets of metal and big book on soldering. Packed in the Gilbert Toy sealed carton 12½ x 8½ x 2 inches. Weight approximately 2 lbs

No. 7002

Gilbert Designer and Toy Maker

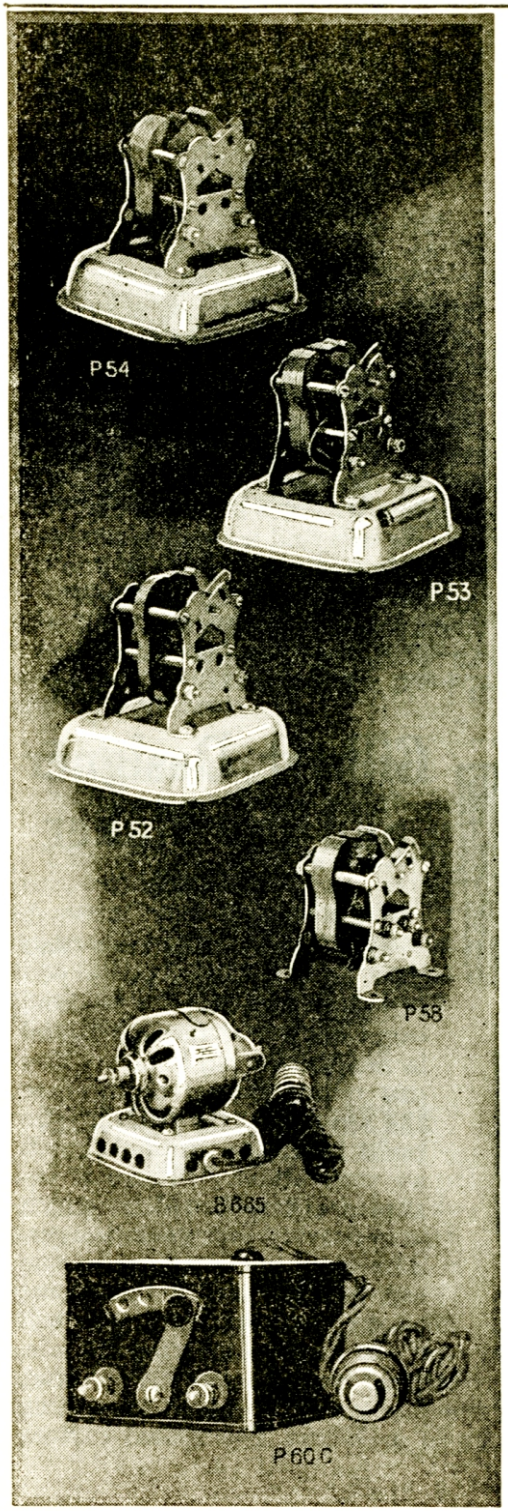
No. 8001

Think what an advantage boys who are interested in scroll saw work have today with a Gilbert Designer & Toy Maker outfit over the boys who had to do their scroll saw work without it. Read the manual and understand the possibilities of the outfit. Learn how to enlarge or reduce different designs with the apparatus included and be able to explain it without any hesitation. You will be interested in the animal puzzles printed on the top of the board. The idea of that is to trace with the stylus one of the animals. If you have followed the correct lines, you will find a small reproduction that your pencil has made. The animal puzzle is just something for you to start on. After you know how to use the set you can use any design you want—transfer it to wood and then saw it out with the scroll saw included in this set. You can build easily bird cages, small book racks and a number of useful articles. Packed in the Gilbert Toy sealed carton 12¼ x 8¾ x 1¼ inches.

Gilbert Designer and Toy Maker

No. 8002

This larger Designer and Toy Maker outfit gives you complete material for making exact copies of designs found in magazines and books. You can either reduce or increase the size of the article you build from the original sketch as you prefer. There is included also a board on which you can try out your designs. After your pattern is made, you can use the colors that come in this set to paint it with very pretty effects. This toy making work you will enjoy because you can make articles for your own use or gifts for your friends. There is no other way that you can make your play more pleasant than this, and you have the satisfaction that comes to every boy while he does something to benefit himself and others. This set comes in a Gilbert Toy sealed carton, size 18 x 10 x 1¼ inches.



Gilbert Toy Motors

You know that unless a motor works when you want it to, it is more trouble than it's worth. And I can tell you, boys, these Gilbert Toy Motors work. They are strong and powerful and will surprise you with the way they stand up. Of course, besides motors, I make lots of electrical toys to be used with them, such as control switches, reverse bases, transformers and electric shockers. But you can be sure you can depend on all of them to do the things you want to have them do. They are great to use with your Erector models. Your regular toy dealer sells them.

P 52 Motor. A dandy two-terminal motor for operating light-running models. Operates on either batteries or from transformer. Height, 3¾ inches.

P 53 Motor. This motor has two terminals, pressed steel base, latest type tubular holders with copper gauze brushes. Works great. Height, 3¾ inches.

P 54 Motor. This is the same as P 53 Motor mounted on a reverse base, so that you can run it either backwards or forwards. Fine for running elevator models. Height, 3¾ inches.

P 58 Four-Terminal Motor. I made this motor specially for operating Erector and other Mechanical Toy models. Can be used with P 59 Reverse Base or P 61 Control Switch. You won't find a better motor for the price anywhere. Height, 2¾ inches.

B 685 Universal Motor. This is more than a toy. It's a real motor of 1-50 horse-power. The same motor I use to run all my big machine shops. Die cast frame. Cast base similar to base on P 56C. Has cord and plug ready to attach to any lamp socket. Height, 5 inches.

P 60C Transformer. This transformer saves the use of batteries. Attach it to your electric light socket (alternating current only) and run your motor direct from it. Comes with 5-ft. cord and plug. Size, 3½ x 3¾ x 2½ inches.

Gilbert Toy Motors

P 73B Motor. Cast iron motor shell and base. Looks very much like big commercial motors. Can be used on batteries or from house current through a transformer. Height, 4¾ inches. Price, **$5.00.** (In Canada, **$7.50.**)

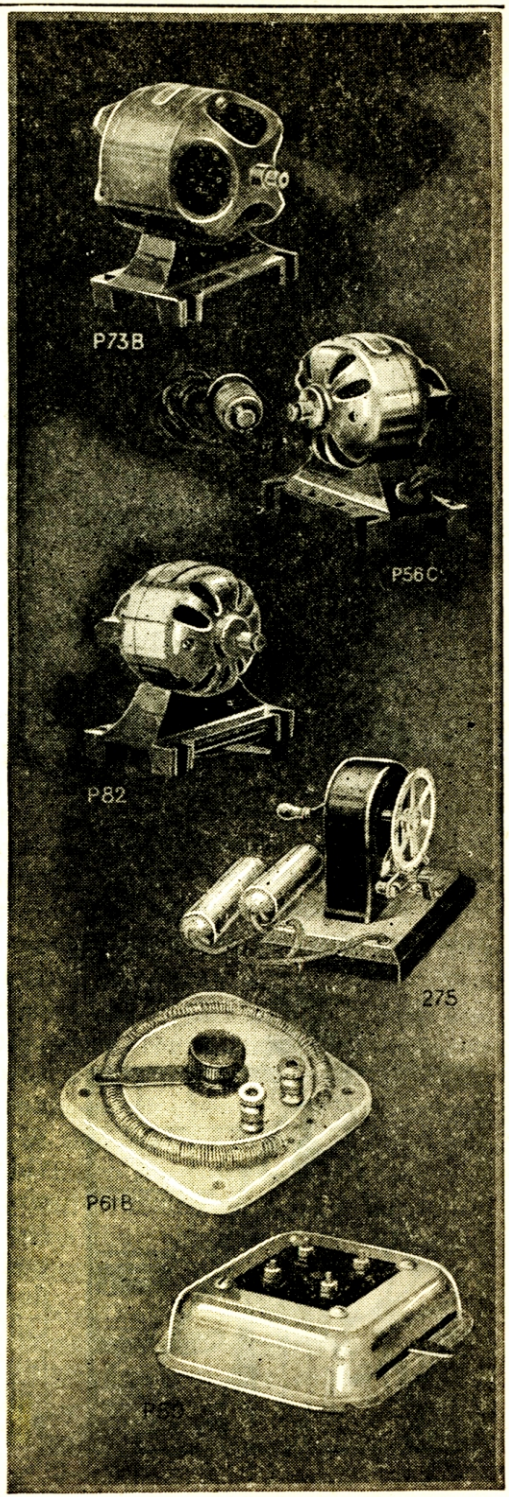
P 56C Motor. This is one of the strongest universal toy motors made. Attaches direct to electric light socket, operating on alternating or direct current 110 volts. Made of cast iron with bearings an integral part of die casting. Height, 3⅞ inches. Price, **$6.00.** (In Canada, **$9.00**)

P 82 Battery Wound Motor. This motor is meant especially to be used with batteries. Has die cast frame and cast iron base. Height, 3⅞ inches. Price, **$5.00.** (In Canada, **$7.50.**)

275 Electrical Shocker. Here's an electrical toy you can have loads of fun with. Get your friends to hold the handles and give them a real electric shock. Size, 4 x 2¾ inches. Price, **$2.50.** (In Canada, **$3.75.**)

P 61C Control Switch. With this control switch you can regulate the speed of your motor. It is controlled by lever, just like all big rheostats. Porcelain base. Size, 4 x 4 inches. Price, **$1.00.** (In Canada, **$1.50.**)

P 59 Reverse Base. This is used to operate four terminal toy motors either backward or forward. Can be directly attached to motor P 58 or at a distance with longer wire. Size, 4 x 4 inches.



Gilbert Carpentry

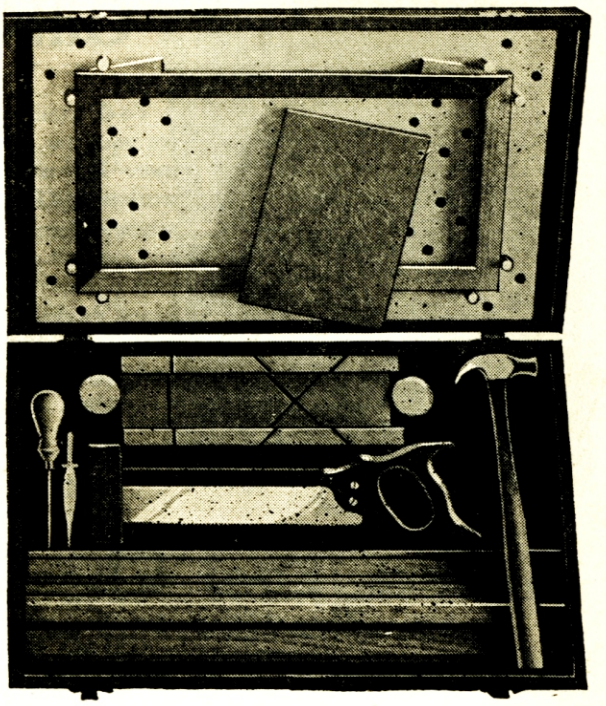
No. 701

How many times have you watched carpenters at work and noticed how carefully they made plans to build a bench that was probably going to be used in a home, or perhaps they were doing some repair work? Wasn't it interesting to see how the different tools were used? First, it was the saw to cut the board to a certain length, then a plane with its sharp cutting blade made the board as smooth as glass, then holes were drilled so the board could be fastened in place by screws or nails. Haven't you wished that you could do things like that? Of course you knew that the size of tools the men used were too big for you. If only you could get the right size saw, hammer and brace, you were sure you could build articles yourself.

Now, if you are ambitious, you can get an outfit that will suit your needs exactly. The Gilbert Carpentry Outfit contains just the number of tools you want to make useful articles. An apron is included, too, one that you can put on when you start working. This has pockets in it to hold the tools. You don't have to worry about losing a bit or rule, because these you will place in one of the pockets where you can reach them conveniently when you want to use them. Everything is right where you need it. With this set you will learn a great many things about Carpentry. You will see how simple it is to make models and useful things for the house and for your room. There's no end to the things you can build—book racks, flower stands, shelves, etc. Altogether, the Gilbert Carpentry Outfit is a handy set for any boy to own. This set comes packed in the Gilbert Toy sealed carton, 18 x 10 x 1¼ inches. Weight, approximately 7 pounds.

Gilbert Picture Framing Outfit

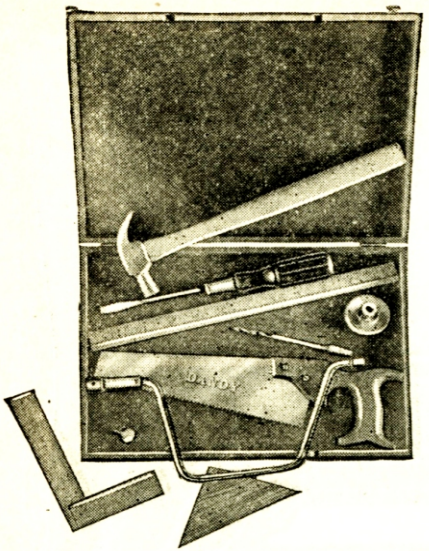
No. 702



In times past, the framing of pictures was always considered a job for the art stores to handle. It certainly is true that picture framing properly done is an art; but it is an art which need not be left to the stores—that is, to professionals. With a few simple, well-chosen tools, a small bench or table upon which to work, and a little careful study, you will be able to design and build your own picture frames and build them right—frames which will add beauty and dignity to your favorite enlargements, color prints, etc. At the same time you will have a whole lot of real fun and satisfaction in making something worth while.

Wouldn't you like to earn a few dollars all by yourself, so you could buy that set of tools, or bicycle, or wireless outfit you have been wanting to own? You can, just as well as not, and this is the way it is done. Get in touch with one of your neighborhood stores—such as a drug store, for example—which does developing and printing. Make arrangements whereby the store is to solicit and accept pictures to be framed, and then turn this work over to you for framing. Your percentage of profit may not be as great this way as it would be if you solicited your own business, but you will get more framing to do. You will certainly find that a store doing a developing and printing business will be able to get far more trade in the picture framing line than you could by making a personal canvass of your friends and acquaintances.

It isn't the money-making side of this new toy that is interesting, there's a whole heap of fun in it, too. Every set contains layout board, mitre box and saw, hammer, etc., together with strips of moulding to practice with. There's also a book of instructions telling you just how to frame pictures. Packed in stained hardwood cabinet, 20 x 12 x 3¼ inches.

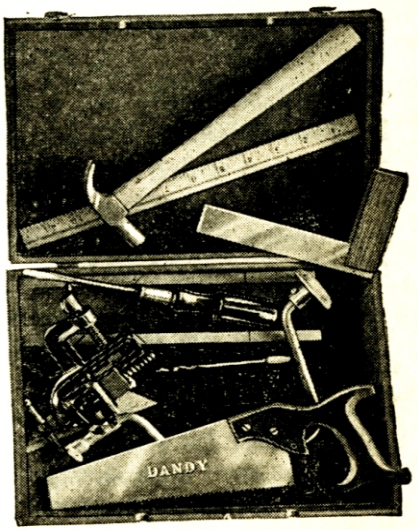


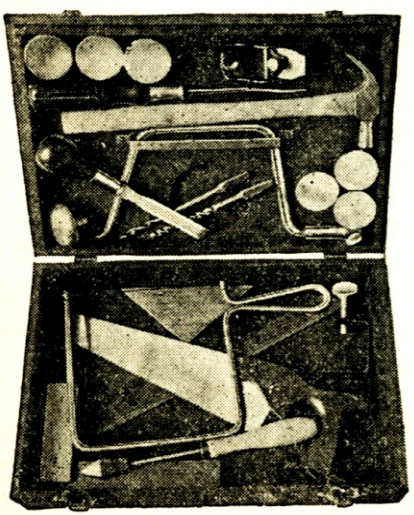
Gilbert Tool Chest
No. 705

To do your carpentry work well your tools must be made for your use. You do not want a big saw or a heavy hammer. If you did you could not handle them easily and your work would be spoiled. In this outfit you have a hammer, screw driver, gimlet bit, wood triangle, wood try square and rule, all of them made the right size for you. With the kind of tools you get in this set it will be easy to cut your board, to drill holes and drive nails without any fear of the work being imperfect. A book on Carpentry comes with each set. The set is packed in a hardwood cabinet, 3½ x 7 x 4 inches. Weight approximately 3½ pounds.

Gilbert Tool Chest
No. 710

Here is a tool chest to fit the needs of every boy who is interested in woodworking. Just the kind of a chest you have wanted. It is specially compact with the brace forming a very unique handle. When closed it can be carried from one place to another very handily. This outfit contains a saw, hammer, brace, screw driver, gimlet bit, wood triangle, wood try square and a book of instructions on Carpentry. Packed in a hardwood compact chest, 13 x 4 x 5½ inches. Weight approximately 5 pounds.



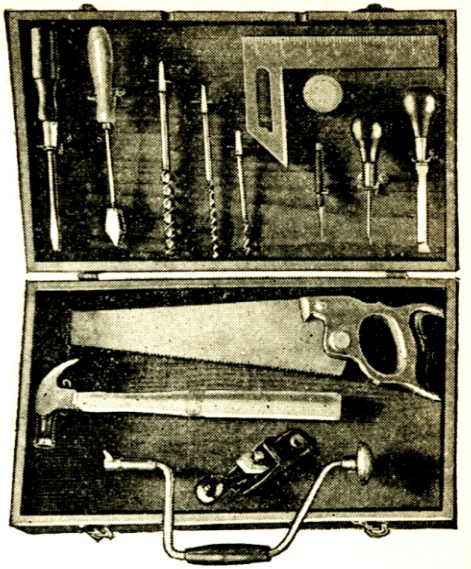


Gilbert Tool Chest
No. 715

n this set is included scroll saws for fancy saw work. With this you can make pretty designs in book racks, fern stands and many other useful articles. There is also a soldering iron—a very handy thing to have around the house. Beside the tools already mentioned you have in this outfit saw, hammer, brace, screw driver, 1 bit, wood triangle, chisel, clamp, nails, tacks, brads, etc., and a book on Carpentry. Packed in a hardwood cabinet with tray. Size 18½ x 7 x 5½ inches. Weight approximately 6½ pounds.

Gilbert Tool Chest

No. 720

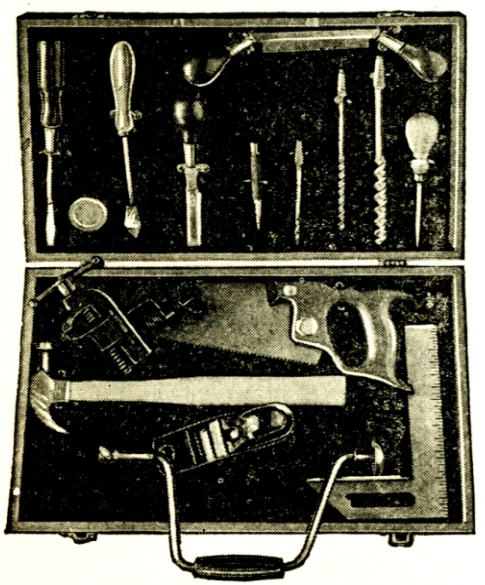


To the boy who wants strong and well-built tools this set will have a special appeal. The material used in making them is the finest quality and the workmanship perfect. Some of the tools contained in this outfit are saw, hammer, screw driver, bits, square, chisel, plane, etc.

An interesting feature of the set is the unique arrangement of the brace for the handle. This makes it possible to carry your equipment about very handily. The cabinet is 15¾ x 9¾ x 3¾ inches in size, is made of hardwood and weighs approximately 7 lbs. The tools fit into it compactly.

Gilbert Tool Chest

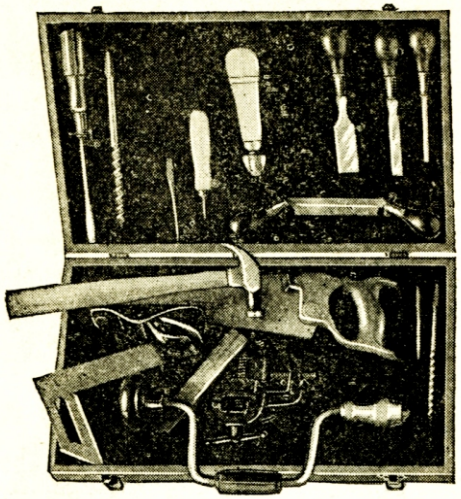
No. 725



A slightly larger assortment of tools than that in the No. 720 chest. You will be satisfied in every respect with this outfit and will find it a splendid chest to have around the house. You will be surprised at how much use you will find for tools, once you have them.

In this set are brace, bits, hammer, draw shave, nail set, plane, chisel, saw and many other tools.

Packed in a specially compact chest with unique handle arrangement. Size, 15¾ x 7¾ x 3¾ inches. Weight approximately 8 lbs. Price



Gilbert Tool Chest

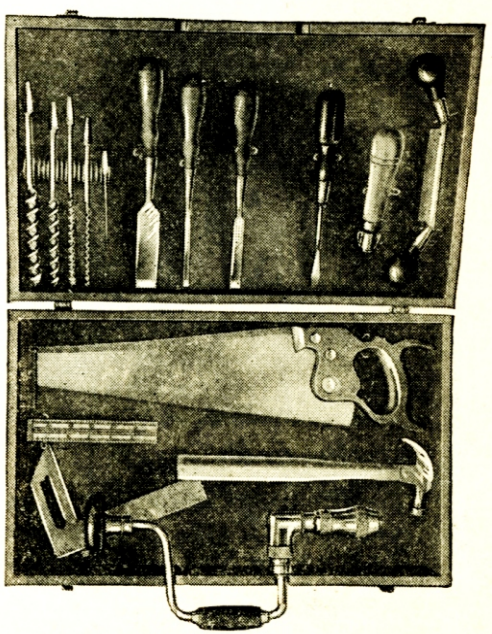
No. 735

Have your folks ever said about you, "He's a handy boy about the house?" If not you surely want to show them that you are just as handy with tools as any other boy. Show them that you can put up new pantry shelves or build a chicken coop or anything else they want built, and be sure your tools are good tools. The No. 735 Chest contains a saw, brace and bits, chisel, screwdriver, hammer and other tools that come in mighty handy. There is also a Carpentry Book showing many useful things you can build. They are all packed in stained hardwood cabinet, 17 x 12 1-3 x 3¾ inches. Weight approximately 10 lbs.

Gilbert Tool Chest

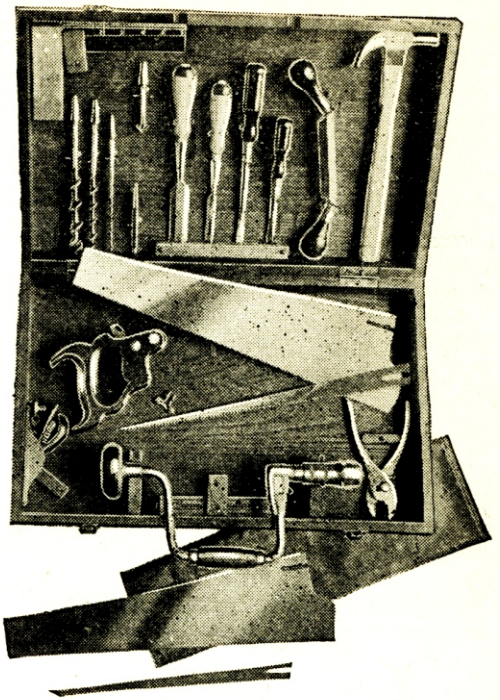
No. 740

A slightly larger outfit than No. 735, put up in the special compact chest that is so easy to carry about. With the tools in this chest, you can build some dandy useful articles for the home. There's a big book on Carpentry included, giving you working drawings on telephone, screen, drawing table, wheel barrow, arm chair and any number of things that you will enjoy building. The tools in this outfit are high-grade tools, the same as a carpenter would buy for his own use. Included are brace, bits, saw, hammer, chisel, screwdriver, try square, etc. Packed in stained hardwood chest, size 21 x 13 x 4 inches. Weight approximately 14½ lbs.

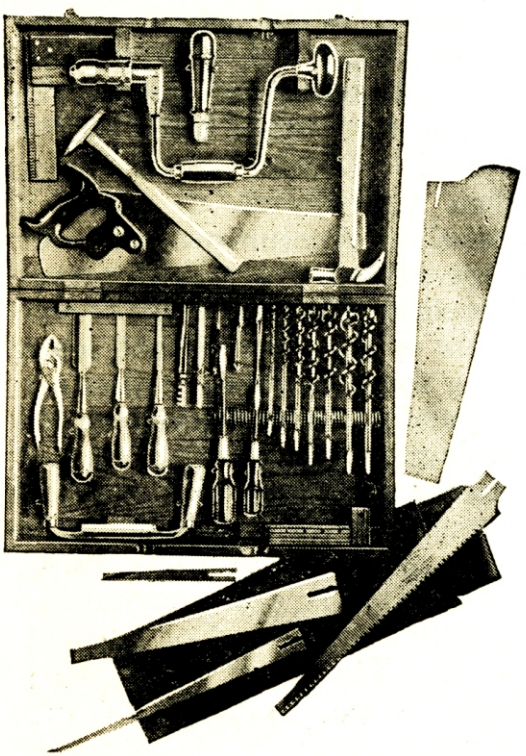


Gilbert Tool Chest

No. 745



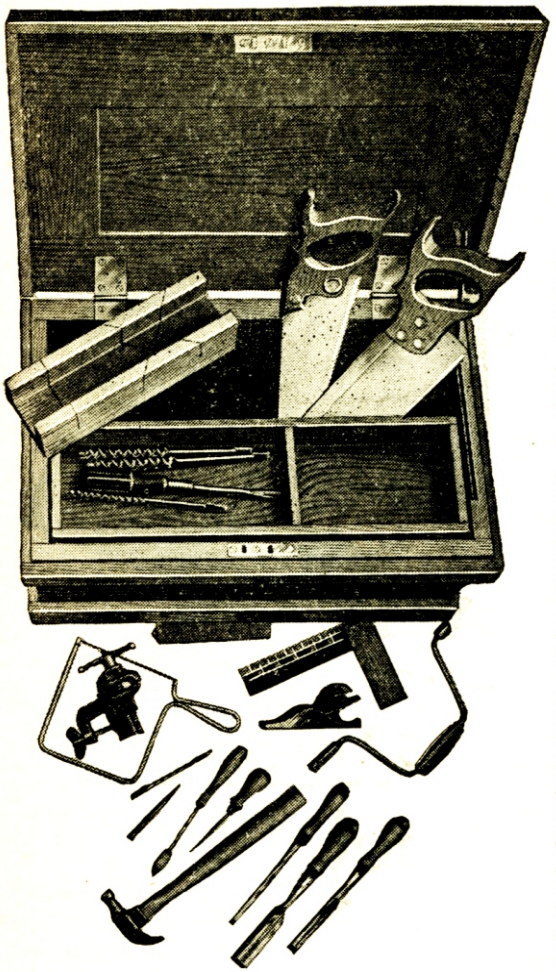
Here's a crackerjack outfit of the best grade tools. The kind you are sure will last. Built of the highest quality steel, they will give you many years of hard service. The chest is the special compact style with the brace making the chest handle. A chest of this kind takes up very little room in your work shop and can be carried from place to place very handily. The equipment is very complete, including saws, brace, pliers, hammer, draw share, chisels, bits, screw driver, etc. The big book on Carpentry tells you the correct way to use tools and shows drawings of many useful things you can build. Packed in stained hardwood chest, size closed, 21 x 13 x 4 inches. Weight approximately 15 pounds.



Gilbert Tool Chest

No. 750

This set is one a boy will be proud to own, and is as complete an equipment as anyone would want to make a work shop for himself. You will find it a very valuable home accessory. A carpenter himself could not ask for better quality of tools or seek a greater collection for any work he has to do. The outfit contains several sizes of chisels, all of them from highly tempered steel, a set of combination saws with adjustable handle, in special case, an assortment of bits, hammer, screw driver, pliers, brace, glass cutter, besides a number of other tools necessary to make your work accurate and finished. Included in this outfit is the big book on Carpentry with the working drawings on useful things you can build for your home. Packed in hardwood chest with polished light oak finish and special handle. Size, 21 x 14¼ x 4 inches. Weight approximately 20 pounds.



Gilbert Tool Chest

in Pershing Cabinet

No. 755

Every boy interested in Carpentry knows well enough the value of a good set of tools. There isn't a workman in any trade who doesn't regard his tools with great pride. He keeps them intact and ready for use always. The tools in this outfit come packed in a special chest bought originally by the U. S. Government for use by the American Expeditionary Forces. This fact speaks for the strength of these cabinets and you can be certain that no matter how rough you use them, you will not be able to damage them to any extent. Consider this point when you decide to make a workshop of your own at your home. Be sure in acquiring a set of tools that you get those of perfect quality. Cheap tools are only an expense as you will learn from experience. It is best in beginning to invest in tools that are dependable, and avoid unnecessary expenditures which you would surely be put to in replacing tools of cheap quality.

This outfit has been made for particular use, for the boy or man who desires a substantial equipment, one that will endure frequent handling and long service. It contains saws, brace and bits, mitre box, square, plane, coping saw, hammer, chisels, and many other useful tools. The chest comes beautifully stained and of polished hardwood, size 20½ x 12¼ x 9⅞ inches. These are fitted with heavy brass hinges and locks with trays for nails, small tools, etc.

GILBERT
Special Tool Chest

(Large Size)

In Pershing Cabinet

No. 760

With this combination you have an outfit equal to that any carpenter would have for his own use. It is not a question of how long they will last you. When you buy a set of this kind you want tools of the highest standard—those you can depend upon to give you excellent service. You can rely upon the Gilbert special chest fulfilling every wish you have in this respect. You and every industrious boy realizes that with a chest of this size you can undertake to do every kind of work, no matter how big or small it may be, with the knowledge that your tools will permit you to give that work a real finish.

No home should be without a tool set of some kind, and the more you use tools, or the more occasion you have to use them, you will find it essential to obtain only the best. If you haven't taken the interest in carpentry that you should, you have made a great mistake.

This tool chest, like No. 755, was built especially for the Government to be used in France by General Pershing's Air Force mechanics during the great war. You know how well-made anything has to be to satisfy the Government, and this chest is no exception. Extremely well built, it makes a chest that any boy can well be proud of, especially with the equipment of tools it holds.

The outfit contains a complete assortment of saws in special case, brace, a number of bits, hammer, plane, vise, chisels, screw driver, pliers, and many other tools that you will have a big use for.

Chest is built of hardwood with highly-polished natural wood finish. Size 20½ x 12¼ x 9⅞ inches.

LEARN HOW TO GIVE
Magic Entertainments

As you boys probably know, I first started this big Gilbert Toy business by making Magic tricks, but long before that I was practising Magic professionally, giving entertainments for lodges, clubs, churches and other organizations, and in this way earned practically my entire expenses for college. For this reason I am in a very good position to appreciate what it means to boys to have something of this kind that they can fall back upon. Something that will help them work their way through school, or give them additional spending money. By no means is it the money alone that you derive from this that makes it enjoyable. . It's one of the greatest ways to amuse yourself and your friends that I know of. Best of all, it trains your eyes, fingers and hands. You know there is an old saying that the hand is quicker than the eye. You probably don't believe that, but after you have practiced Magic for awhile you'll soon see that it is entirely true.

Just imagine surprising your friends by seeming to make dollar bills multiply, or handkerchiefs and cigarettes vanish. Can't you imagine how their eyes would stick out in wonder at your ability. I know what you are thinking. You think that such tricks must be very hard to do, but let me tell you they aren't half as hard as they look. The tricks that look the most mystifying and confusing are the easiest, and the big book on Magic that I have written myself is included with all Gilbert Mysto Magic Outfits, and tells you just how to do many of them. It shows you how to do all the tricks with the apparatus in the set and besides how to perform a great many without any apparatus out of materials you have in your own home.

The tricks in the set are the same ones in miniature that are used by the most famous magicians on the stage. Read over the descriptions on the following pages, boys, and then try out one of the sets. I'm sure you will be convinced that it is one of the best kinds of fun that you ever have seen.

Sincerely yours,

A. C. Gilbert

President.

Gilbert Mysto Magic

No. 2001

A crackerjack outfit for an amateur magician. It contains such tricks as the Multiplying Billiard Balls, Cigarette Vanisher, Disappearing Coins and many others. The Magic Wand and a special show poster also come with this outfit. The show poster you can put up to advertise your magic show when you have practised so that you are able to give it. There is also a big book of directions telling just how to do each trick and giving a line of stage talk for you to use.

Packed in the original Gilbert Toy sealed carton, 12¼ x 8¾ x 1¼, this outfit is a dandy one for beginners. Weight approximately 1 lb. Price, **$2.00.** (In Canada, **$3.00**).

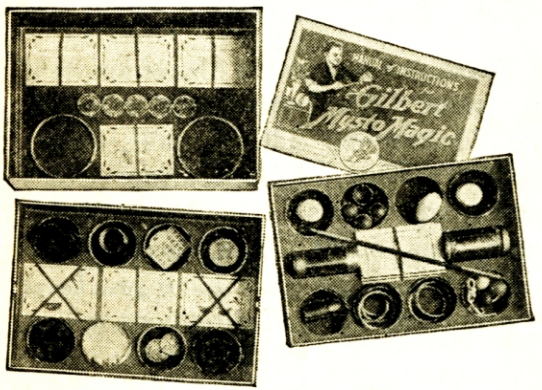
Gilbert Mysto Magic

No. 2003

A magic outfit somewhat larger than No. 2001, and containing more tricks. In addition to those in No. 2001, this set contains the Passe Passe Coin Trick, Chinese Linking Rings and a number of other tricks. If you have this outfit you can give longer shows and perform more difficult tricks. The big book of instructions included exposes every trick, tells you how to hold your hands while performing, and also explains how to do some marvelous tricks, the same as performed on the stage with apparatus you can build yourself. The magic wand and show poster are also part of this outfit. Packed in the Gilbert Toy sealed carton, size 12¼ x 8¾ x 2¼ inches. Weight approximately 2 lbs.

Gilbert Mysto Magic

No. 2004

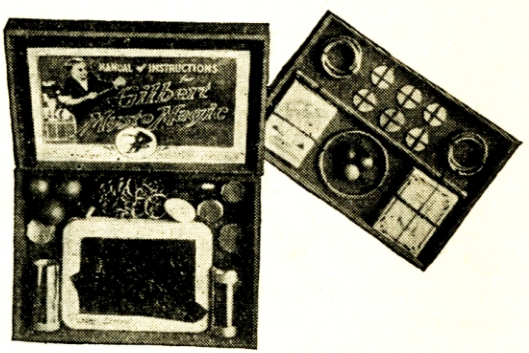


Learn to perform magic tricks just as they are done on the stage by famous magicians. It isn't hard, boys, if you have the right kind of apparatus and a book of instructions written very clearly so you can understand it easily. Just think of the fun you can have making dollar bills appear in your coatsleeve or making cigarettes and handkerchiefs vanish. This outfit contains a very good assortment of famous tricks, like the Drumhead Tube, Linking Rings, Handkerchief Cassette and many others. The book of instructions tells you to how perform each trick and lists many you can do with apparatus you have in your own home. Packed in the Gilbert Toy sealed carton, size 12¼ x 8¾ x 2¾ inches. Weight approximately 2½ pounds.

Gilbert Mysto Magic

No. 2006

Fool them! Nothing surer if you have a Gilbert Mysto Magic set and can present some of the tricks described in the book of instructions. There isn't a boy anywhere who doesn't like the joy of "putting something over" on his friends. Now is the time to play a few tricks with your chum. Tell him you can make a handkerchief or cigarette disappear before his eyes. He won't believe you, of course. He'll think you are fooling, no doubt, but while he is laughing and apparently enjoying a good joke on you, you can give him the surprise of his life.



There's the billiard ball trick equally as mysterious as the handkerchief trick. From a simple billiard ball you produce three others. It seems as if each time your hand moved through the air a billiard ball appeared between your fingers.

Here's the play for you—one you can enjoy any time. This outfit contains many difficult and famous tricks such as the Spirit Slate, Siberian Transport Chain, Drumhead Tube, Handkerchief Cassette and many others. The book of instructions gives complete directions for giving an evening's entertainment. Packed in stained hardwood cabinet, 13 x 9 x 3 inches. Weight approximately 6 pounds.

GILBERT MYSTO MAGIC

THE PROFESSIONAL OUTFIT

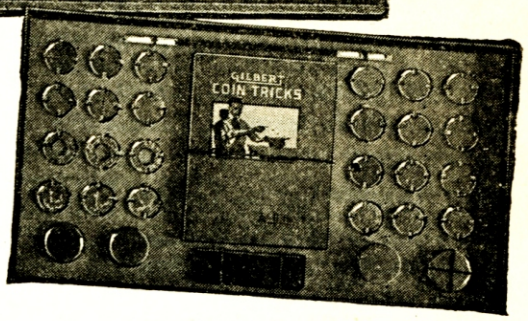
No. 2009

The largest Mysto Magic Outfit I make, and one I call "The Professional Outfit," for with this set you can give a whole evening's entertainment of some of the most fascinating and startling tricks performed on the stage to-day. There's card tricks for sleight-of-hand work, coin tricks for palming, etc., flag tricks, ring tricks, and many that will keep your audience wondering at your ability. The whole equipment comes packed in a stained hardwood cabinet, so arranged that you can use it to assist in your performance. The book of instructions, which is included in this outfit, is a very interesting book on magic. Besides exposing every trick, telling you just how to perform them, how to hold your hands, how to talk on the stage, and such valuable information, it also gives a line of magician's "patter" for a complete entertainment. After you have practised the tricks and are able to perform before an audience, you can memorize the pages in the back of the book, and by adapting the talk to fit your own particular audience, give an entertainment that will do you credit. Just think what your friends will say when they find out you can perform the same tricks that they have seen famous magicians do on the stage. Can't you imagine how interested they'll be? Take my advice and don't expose the tricks after you have learned them, make them wonder at your ability, and besides if you tell everybody how the tricks are done they won't be anxious to have you give entertainments for them.

The outfit complete is packed in stained hardwood cabinet, size 16⅞ x 10¼ x 2⅞ inches..

Gilbert Coin Tricks

No. 2020



Just think! You can give shows and mystify your friends with the same fascinating coin tricks that are used on the stage today by many of the professional magicians. You can learn all sorts of palming and sleight-of-hand tricks—feats of magic that are very interesting and mystifying.

You can make a coin vanish from a newspaper—vanish a coin from your closed hand—make coins appear out of the air—pass a coin through a table—vanish a coin from a glass, and many other tricks that will make your friends' eyes open in wonder.

With a Gilbert Coin Trick Outfit all of these things are simple. There is a big book comes with each set explaining how each trick is performed, just how to hold your hands when giving shows on the stage, how to talk so that you will divert the attention of your audience, in fact all the information you need to give Magic Coin Trick entertainments.

The Outfit contains a complete assortment of magic coins for all the different tricks, together with other apparatus necessary. Packed in the distinctive Gilbert Toy sealed carton, size 18 x 10 x 1¼ inches.

Gilbert Knots and Splices

No. 2021

They thought the rope was tied tightly and in a way that would make it impossible for you to escape. From all appearances they were right, but they did not know that for you it was a very easy matter to escape. You had an outfit of Gilbert Knots and Splices from which you had learned how to make various kinds of rope ties, and how to get out of them. There was hardly a knot that any one could show you that you wouldn't know how to tie and untie.

If you haven't already one of these sets, you certainly want to get one, for with it you will learn how to splice rope; how to tie useful knots; and how to do many tricks that are now being performed on the stage by famous magicians. You can give shows for your church or club. Your boy friends will admire you for being clever and will want to join in the fun.

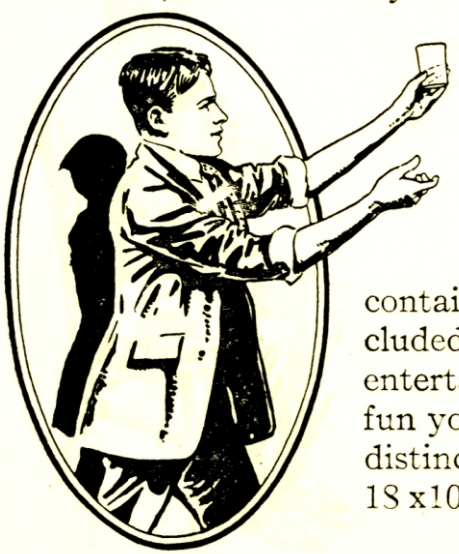
For real pleasure—for a crackerjack way of entertaining your friends, get a set of this kind. You will be pleased with it all right. Outfit contains a complete assortment of sample knots, with a quantity of rope to practice with, as well as a complete book on knots, telling how to tie them and how to perform many startling experiments. Packed in the Gilbert Toy sealed carton, 18 x 10 x 1¼ inches.

GILBERT Chemical Magic

No. 2022

How do you suppose magicians on the stage pour red, then white and then blue liquids all from the same pitcher right before your eyes? Haven't you envied them and wished you could do wonderful tricks of that kind? It really isn't as hard as it looks, once you know how, and a Gilbert Chemical Magic outfit exposes all the secrets that have mystified you so long.

With one of these outfits you can give a complete entertainment of chemical magic that will fascinate and mystify your friends. There's a big book in every outfit telling just how to do each trick, how to hold your hands when performing and all other necessary information. With a little practice you can soon be earning a good deal of extra spending money. The outfits contain a complete assortment of chemicals, some in liquid form in glass bottles, sealed with wax, and others in powder form in wooden containers. There are enough chemicals included with which to give a whole evening's entertainment. You'll be astonished at the fun you can have with this set. Packed in distinctive Gilbert Toy sealed carton, size 18 x10 x 1¼ inches.



Gilbert Handkerchief Tricks

No. 2023

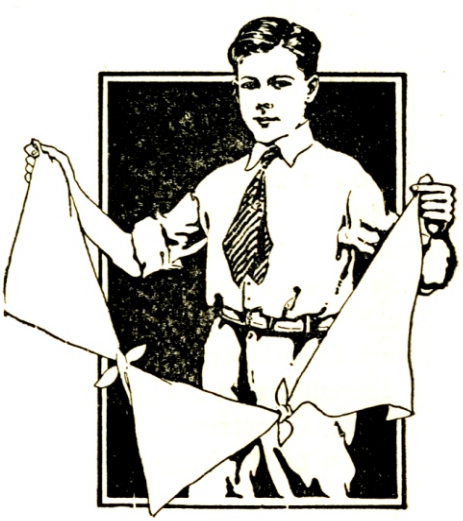
Any act with the slightest bit of mystery to it is sure to make people curious. You can derive a great amount of pleasure in fooling people, and the best part of it is they are unable to detect any part of your trick because your movements are accurate and snappy.

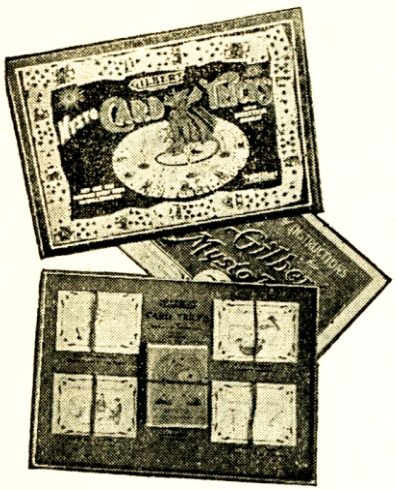
One important item in any act of conjuring is the talk you give while doing your tricks. You can in this way turn the attention of your audience from your act when the maneuvre you make is difficult.

Gilbert Handkerchief Tricks contains a collection of clever and novel feats in conjuring.

With it is included a book of instructions telling you in a very simple way the manner in which each trick is prepared. The number of illustrations is large because every move that must be made is pictured so that you cannot misunderstand any direction given.

The outfit contains all the material you need to give a full evening's entertainment for your friends or your club. With it you will have no end of fun doing some seemingly marvelous and startling tricks. Not only that, but with a little practice you can soon become skilled enough to give shows for money, and in that way earn a good deal of extra spending money. The set comes packed in a stained hardwood cabinet, 16⅞ x 10¼ x 2⅞ inches. Weight approximately 3½ pounds.





Gilbert Card Tricks

No. 2007

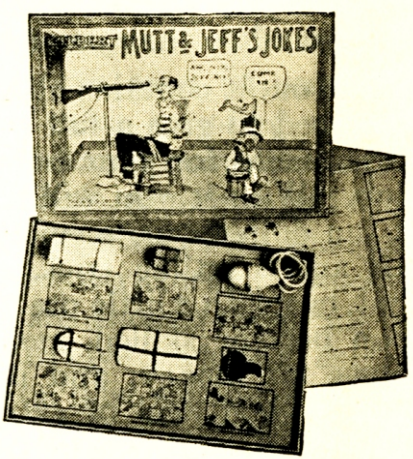
Boys, when you have watched magicians perform their mystifying card tricks, haven't you had the desire to perform those very same stunts yourself?

It is great sport, and live-wire boys can easily become masters in this line of entertainment by closely following directions given in the Book of Instructions which comes with every Gilbert Magic Card Trick Outfit.

In addition to the Magician's pack of cards, with which can be performed a great number of tricks, are eight other mysterious card stunts that are used by the foremost magicians. Set packed in special Gilbert Toy sealed carton.

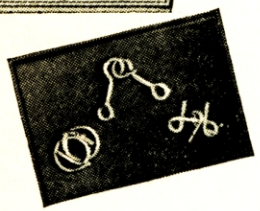
Gilbert Mutt and Jeff

No. 2008



Every boy knows about Bud Fisher's famous comedians, Mutt and Jeff. You fellows have had many a good laugh and thoroughly enjoyed the pranks these laugh-provokers are pictured doing in all the newspaper comic supplement pages. Best of all, the jokes and tricks they do are harmless and are stunts every regular fellow wants to get away with himself, and if an outfit chock full of jokes and tricks that are corkers appeals to your fancy, No. 2008 Mutt and Jeff Joke Set is what you are after.

The Sore Finger, Rubber Tack, Plate Lifter, or Heart Palpitator, Ravelling Joke, Window or Plate Smasher and Magic Ink Spot, come packed in Gilbert Toy sealed carton with Book of Instructions telling you just how to do and get best results out of a collection of the biggest laugh-producing tricks ever invented.



Gilbert Puzzle Party

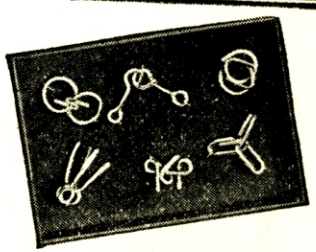
No. 1029

A good puzzle to solve—one that is a corker and which will test your thinking power to the limit is about the most fun you could wish for, and the No. 1029 Gilbert Puzzle Party Set provides an entertainment for you and your friends which is hard to beat.

With the puzzles in this outfit, different games can be played and prizes given to the person solving the various puzzles first. Instructions for each trick telling just how to do them, come with each set which is packed in the Gilbert Toy sealed carton.

Gilbert Puzzle Party

No. 1030

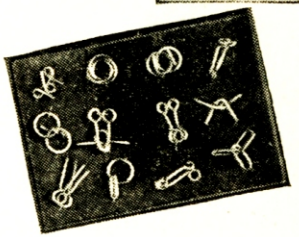


No one really seems to know when, where, and how puzzles originated. In fact, the greatest puzzles in all Puzzledom is in regard to their origin. With the varied assortment in the No. 1030 Gilbert Puzzle Set, your puzzle-solving ability will be tested to the limit. There is always a spirit of keenest competition in one of these puzzle contests and interest is kept at highest pitch until the winner is declared.

Outfit complete with Book of Instructions giving all necessary information and directions regarding all puzzles in set comes packed in the individual Gilbert Toy sealed carton.

Gilbert Puzzle Party

No. 1031



Just imagine a dozen of your friends all seated around a big table, each with a different puzzle to solve and each one trying their best to win the prize that has been put up for the one who masters the puzzle first! There is nothing more fascinating than a good puzzle, and the fun there is in doing these tricks will keep you right on your toes every minute.

With the assortment of puzzles in the No. 1031 Set, a most enjoyable party can be had, and a special Book of Instructions which comes with this outfit gives complete information about each individual puzzle.

Set packed in the Gilbert Toy sealed package.

Gilbert Puzzle Party

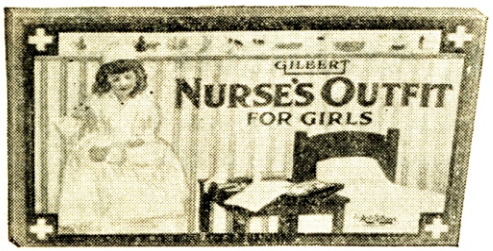
No. 1032

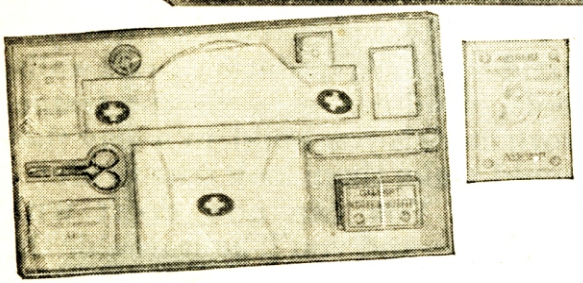
A complete assortment of all Gilbert puzzles is what is included in this No. 1032 Puzzle Party Outfit, the largest and most popular set we have ever made up. A wonderful variety of tricks, each one being entirely different from the other. Not only is there that fascinating fun connected with the solving of all puzzles, but a good training in quick thinking as well, for to solve a puzzle it is necessary to think and think quickly and logically.

The set is complete in every detail, and a great variety of tricks makes possible one grand big Puzzle Party.

Outfit packed in the Gilbert Toy sealed carton with complete Book of Instructions and supplementary folder covering additional miscellaneous tricks.

GILBERT NURSE'S OUTFIT No. P83





Every little girl wants to have plenty of fun just the same as her brothers, and a P 83 Nurse's Outfit is gotten up for this very purpose. Just imagine the dandy times you can have playing nurse and fixing dolly up with all the equipment there is in this corking little outfit for girls.

In addition to the cap, apron, and arm bands which are just the same as grown-up folks wear, there is all necessary articles that a nursing set should include, and there is hours and hours of fun for you and your little girl friends. It is just the kind of an outfit every miss wants in her playroom. Packed in Gilbert Toy sealed carton, size 18 x 10 x 1¼ inches, with First Aid Primer included. Weight approximately 1½ pounds.

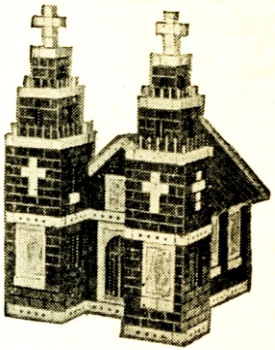
GILBERT PHOTO-PHADS No. 2024

Gee! It's great to have a Photo-Phad set and transfer photographs and pictures to cloth, glass and paper. The boy or girl who sees a picture of a pretty landscape or other design can easily decorate a sofa pillow, a glass window, a cloth hanging, etc., with this new method. Then, too, it's possible, to print your own photograph on your letter paper. Think how interested your friends will be when on opening your letters they see your picture right at the top of it. And the best yet, is for the boy who wants to put his favorite photo on his watch. This can be done easily and with such a wonderful effect that it will make every one who sees it curious. The material in your outfit will make all your prints permanent, so you need not be afraid that they will rub off.

Don't think you have to own a camera to enjoy this outfit. You can transfer photographs your friends give you, or make copies from pictures in magazines and books. Packed in new Gilbert sealed carton, size 18 x 10 x 1¼ inches.

BRIK-TOR

"The Toy for Young Architects"



Here's just the toy that all boys who own construction toys have been waiting for—a toy that enables you to complete your models so they look real.

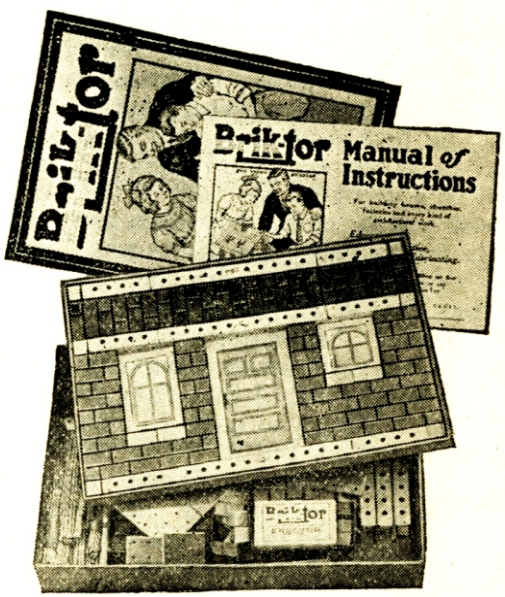
No. A

Haven't you often wished that you could add the foundation, brick walls, roofs, windows, etc., to the framework models you build, in a way that would make them look true to life?

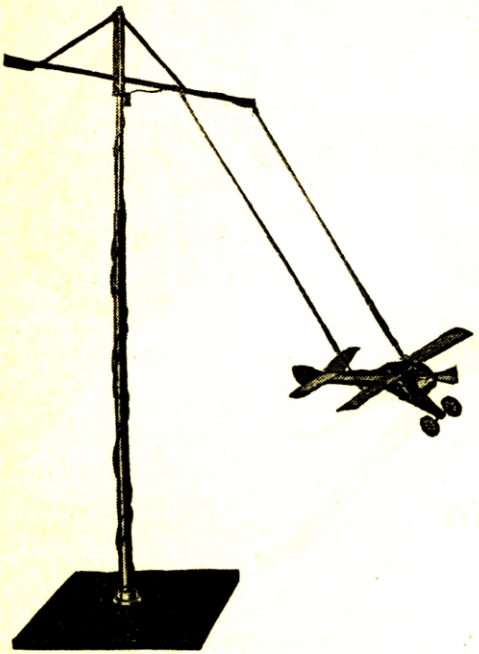
Well! You can now do it with Brik-tor—and you'll have double the fun as a result. You will have an opportunity to prove your architectural as well as your engineering ability. You will now be able to build whole cities, add foundation walls, roofs to your buildings, bridges, etc., with steel bricks in many strikingly beautiful color combinations, and you will be able to put in the windows, too, and streets, sidewalks and piers—everything! There are two outfits:

No. A. In the Gilbert Toy sealed carton, 12¼ x 8¾ x 1¼ inches.

No. C. Packed in cardboard carton, size 12⅜ x 8¾ x 2 inches.



No. C

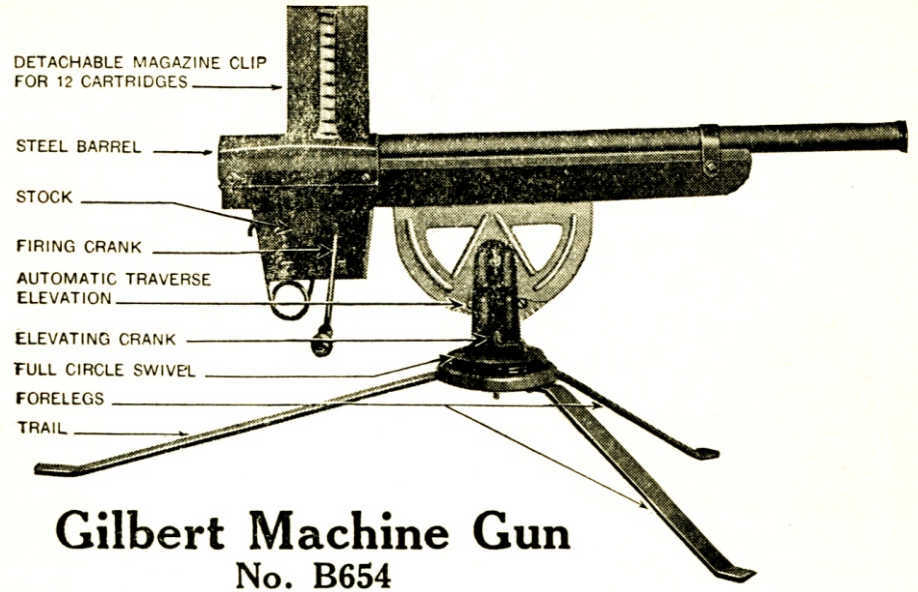


Air-Kraft Outfit

No. A103

Flying an airplane is the greatest sport in the world, boys, and very soon I'm sure they'll be as common as automobiles. Some of you boys will probably own machines yourself and think nothing of flying from city to city, or even over a number of states, just for an afternoon's pleasure. I wish I could build real aeroplanes for you, but as that is impossible, I'm doing the next best thing and building one in miniature.

This is an all-metal Aeroplane that flies about a tall wooden stand. The wires that support the plane of its flight bring the electric current to the powerful little motor by which the aeroplane is driven. It is a monoplane finished in bright red and yellow, with the stand finished in black. Has bright red wheels on the landing gear. Equipped with rudder, stabilizer, and elevating planes. All necessary parts are included, together with complete instructions for assembling. Can be operated on batteries or from house current through a transformer.

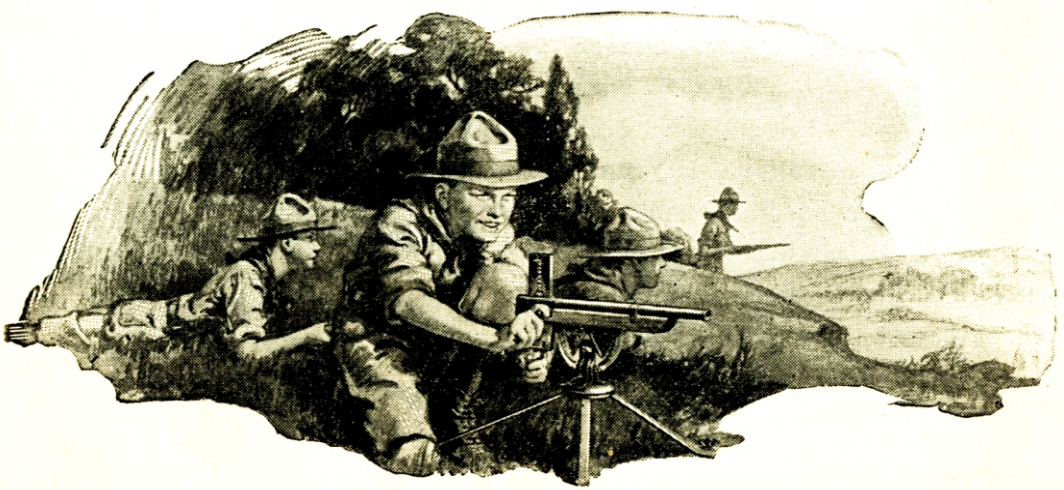


Gilbert Machine Gun

No. B654

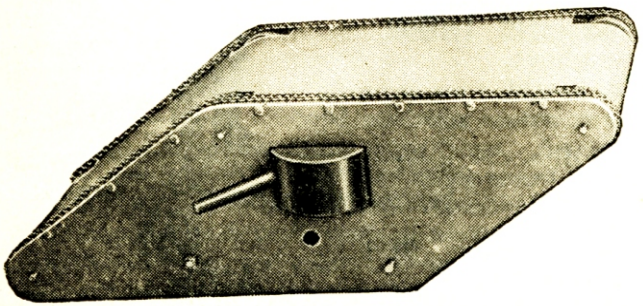
If there ever was a real live-wire toy for red-blooded boys, this is it. Say, you can have more genuine sport with this Machine Gun than anything I know of. It's the real thing. I've designed it after the big machine guns which played such an important part in the big war. Has steel barrel, finished in black enamel. This is mounted on wooden stock and fastened there with steel strips. Then there's a detachable magazine clip which holds ten wooden cartridges right in position, so that you can shoot all of them in almost a second. The trigger is fired by a very strong spring which shoots the cartridges thirty or forty feet. They are harmless and you won't hurt anyone. The whole gun can be elevated to use as an anti-aircraft gun or swung around to fire in any direction.

Then, too, there is the Machine Gun Manual, which comes with every gun. It tells you how to organize your own machine gun company with seven of your boy friends and yourself as Corporal. Of course, as you own the gun and get up the Company, you should be its leader. There's no end of fun you can have with this gun.



GILBERT TANK

No. A112



Here you are, boys! A miniature model of the famous British Tanks, which played such an important part in the Great World War. Fun? Gee, there's no end to the fun you can have with this war machine, and when you are playing soldier with your chum you can have the greatest sport imaginable! This little war machine has a sturdy drive, is propelled by clock movement, and is equipped with a heavy double spring, which is key wound. Just like the original models, which forced their way over the battlefields of France, these little tanks have their moveable gun turrets on each side, and nothing can hinder their headway once they get going.

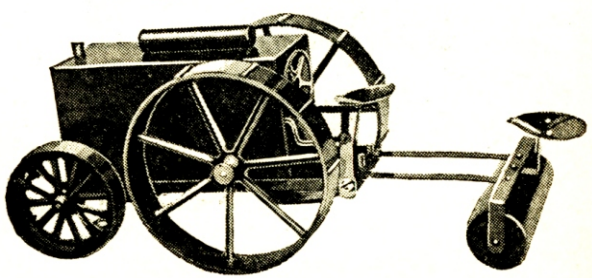
A corking little war toy packed in special Gilbert carton. Size, 14 x 6½ x 5 inches. Weight approximately 3 lbs.

GILBERT TRACTOR

No. 805

Every wide-awake boy knows what wonders the Tractor has accomplished, and what a tremendous aid it is in the great farming districts of the West. You boys want to see how these up-to-the-minute machines work, and the Gilbert Tractor is an exact miniature model of those big, powerful machines, which make possible enormous yields on all food products, which the world is constantly using.

Driven by powerful spring clock-work mechanism, which is key wound, this little worker of the soil does all the stunts the big machines do, and there sure is piles of fun playing farmer with this novel outfit. Plow, roller and harrow attachments, with instruction sheet, comes with each set, which is packed in a labelled carton. Dimensions over all, 10 x 6 x 9 inches. Weight approximately 6½ lbs.



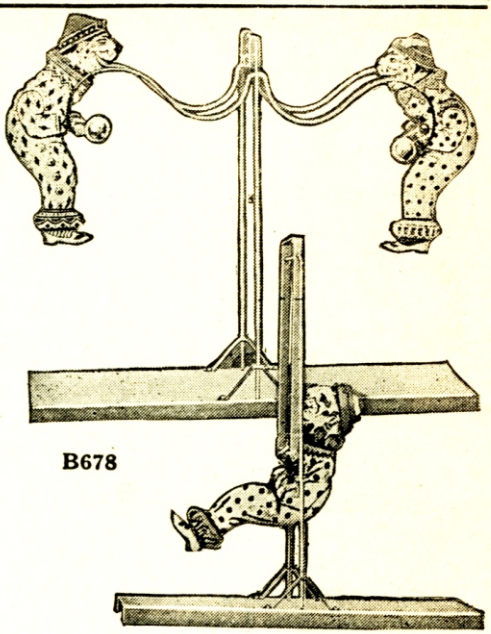
Tumbling Clowns

The most amusing toys you ever saw. They consist of stand and upright bar over which the laughable little clowns tumble—all the time turning somersaults. Bells are fastened to each clown, and jingle merrily. Made of metal throughout, with the clowns lithographed in bright colors.

They come knocked down, with full directions for assembling.

No. B677—Single Clown. (Canada **$2.25**).

No. B678—Double Clown.



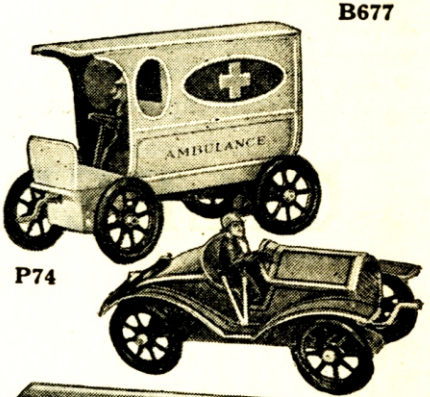
B678

B677

Mechanical Autos

with Spring Motors

Some classy little mechanical autos that are driven by a specially-made strong spring motor, attached to the body of the cars by a patented process. When you wind up that spring—boy! watch them go! Each car is built of brightly lithographed metal.

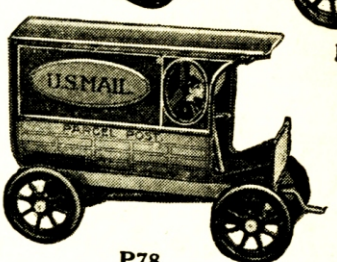


P74

P76

No. P74—Ambulance. Body finished in white, with cross in a red panel. Red wheels. Looks a lot like a real ambulance.

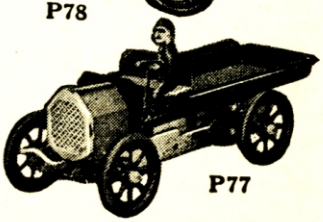
No. P76—Racer. A rakish, classy-looking little miniature automobile racer. Finished in yellow, trimmed with black. Has red wheels and spare wheel fastened on back.



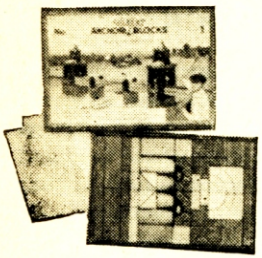
P78

No. P78—Mail Wagon. A regular mail wagon. Finished in yellow and black with red wheels.

No. P77—Truck. A corking little mechanical truck. Finished in bright red and black.



P77

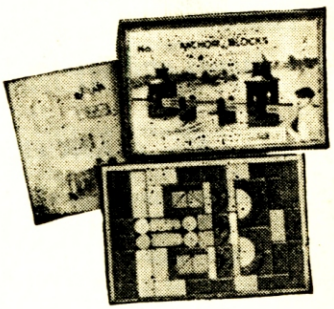


No. 1 Stones and Erector Parts

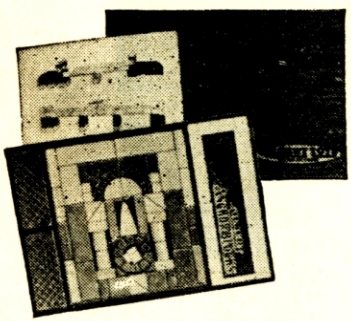
GILBERT
Anchor Blocks
Real Stone Building Blocks

Here you are boys, real stone building blocks with which you can build miniature models of houses, bridges, churches, city halls and many other things. Best of all, the stones and bricks are designed just like the big stones that are used to make real buildings. Your models will look true to life and dandy reproductions of all kinds of architecture. Each outfit contains an assortment of stones in many sizes, shapes and colors. Some of the outfits contain stones only for building churches, houses, garages, fire engine houses, city halls, libraries and any number of those kind of buildings, while other outfits contain the famous Erector parts for building bridges, tunnels and engineering models of that kind. The Erector parts, you can also use as foundations for sky-scrapers, towers, wells etc.

With every outfit comes a finely illustrated design book printed in colors and showing many models that have already been built with Gilbert Anchor Blocks. You can, of course, build many models not shown in the book that you think of yourself.



No. 2 All Stones



No. 3 Stones and Erector Parts

No. 1 ANCHOR BLOCK OUTFIT

Contains the standard Erector parts together with an assortment of various colored stones. Packed in the Gilbert Toy sealed carton.

No. 2 ANCHOR BLOCK OUTFIT

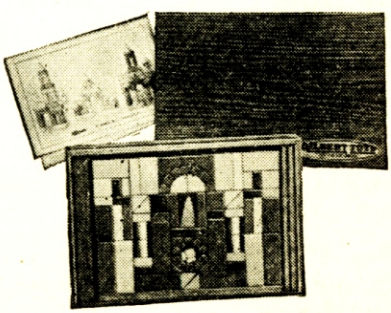
Made up of all stones in many different sizes, shapes and colors. Packed in the distinctive Gilbert Toy sealed carton.

No. 3 ANCHOR BLOCK OUTFIT

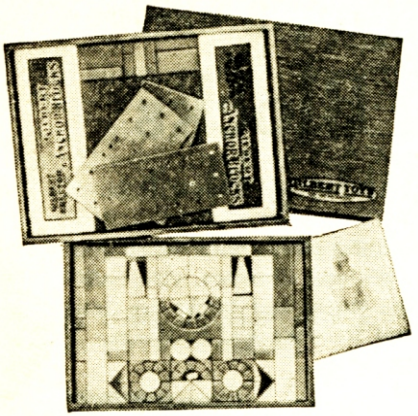
Contains a liberal assortment of colored stones in various shapes and sizes as well as the standard Erector parts. Packed in stained hardwood cabinet.

No. 4 ANCHOR BLOCK OUTFIT

A crackerjack set made up entirely of stones. The many different sizes and shapes enable you to build some mighty interesting models. Comes in stained hardwood cabinet.



No. 4 All Stones



No. 5 Stones and Erector Parts

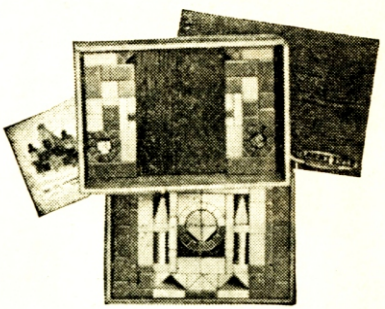
No. 5 ANCHOR BLOCK

Boys! Here is a set that is one of the greatest combination outfits for architectural building you ever saw. It is a corker and contains all necessary steel parts for bridge building from the famous Erector construction toy, and these, linked with a big variety of different shaped Anchor Blocks, make possible a reproduction of practically any building or bridge you want to duplicate. It is a set you and your friends can play with for hours and hours and have good times building all sorts of models.

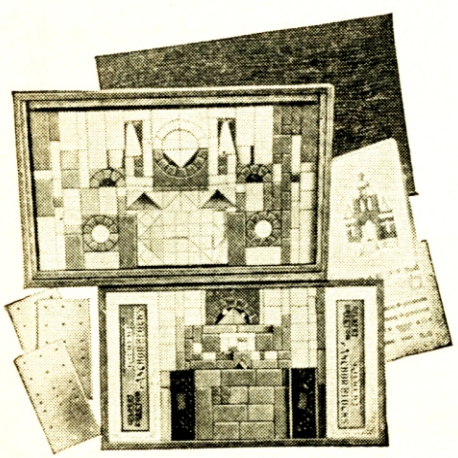
Two layers of beautifully colored blocks packed in special hardwood cabinet, and layout sheet with book of designs thoroughly illustrated in colors makes a set every young builder should have.

No. 6 ANCHOR BLOCK

With the equipment in this set, boys, you can build a little city in itself or reproduce some of the greatest buildings that are wonders of architectural accomplishments. Then again, your chum can build with you and you can let Dad be the judge and decide who has made the best model. There is the greatest fun you ever saw playing with these blocks. Attractive buildings such as churches, court houses, schools, etc., can all be built in miniature from the contents of this set which comes packed in hardwood cabinet with design book illustrated in colors.



No. 6 All Stones



No. 7 Stones and Erector Parts

No. 7 ANCHOR BLOCK

This set, boys, is the first in the series of the larger outfits. Fully equipped with all the necessary parts for expert building. There is no limit to the number of models you can make from the large and varied assortment of blocks and steel sector parts, and there the greatest fun ever playing with this set.

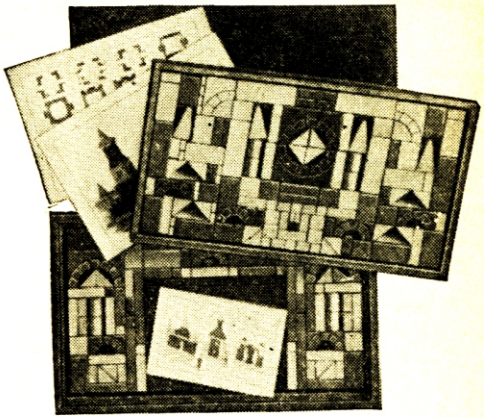
With the yellow, red and blue construction blocks covering a big range in size and consisting of upright columns, squares, oblongs, triangles, arches, etc., wonderful designs can be made in miniature of public buildings, bridges, etc.

Set comes packed in hardwood cabinet and has ground plan sheet as well as two beautifully illustrated books in colors.

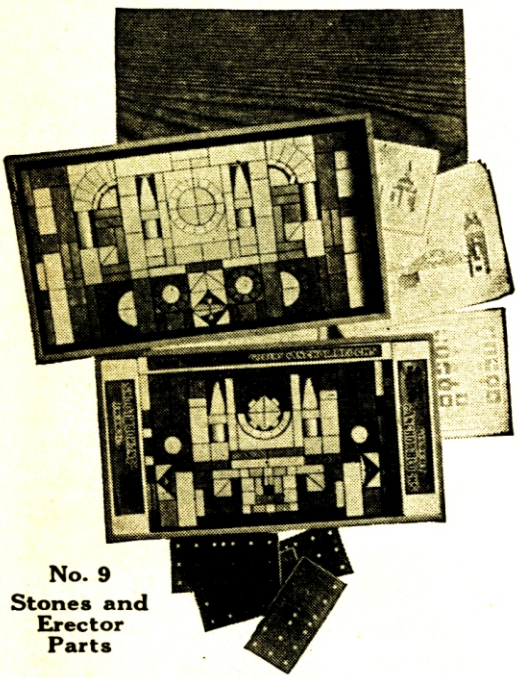
No. 8 ANCHOR BLOCK

There is approximately 250 different blocks in this set ranging in all shapes and sizes, and the yellow, red and blue stone pieces make possible the duplication of any building you want to design. Curved arches with inlaid brick effect, cylinder upright columns, large and small angle pieces, squares, oblongs and flats for inlaying and color effect, make a combination that will allow your building anything and give you the best fun you ever had.

Packed in hardwood cabinet with book of sectional plans and building designs in colors.



No. 8 All Stones



No. 9 Stones and Erector Parts

No. 9 ANCHOR BLOCK

Fun? Gee whiz, boys, you cannot realize what fun there is playing with an architectural construction set like this! It is hard to imagine the different models you can make with this corking outfit. Then again, with the steel Erector parts included in the equipment you can make the dandiest bridges, and the rattling good times you have with this outfit you will never forget.

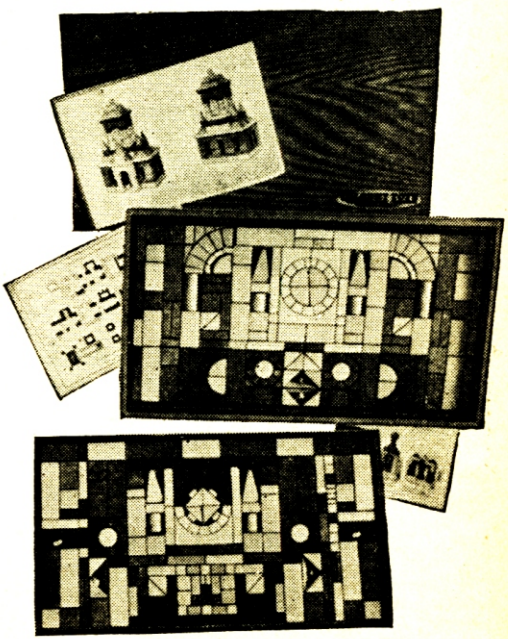
Set comes packed in hardwood cabinet and is one of the best for the young architect to own.

No. 10 ANCHOR BLOCK

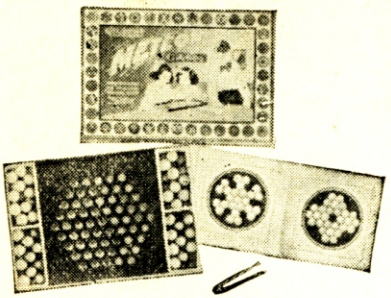
Boys, here is the biggest and best of all Gilbert Anchor Block Sets made up of all stones.

This assortment of different colored stone blocks molded into buildings by the proper placing of arches, columns, flat pieces, squares, oblongs, triangles, etc., gives the young architect every opportunity to show his or her originality to the very best advantage.

Packed in hardwood cabinet with sectional and building plans, illustrated in color, this outfit is truly the acme of perfection in Gilbert Anchor Block Sets.



No. 10 All Stones



No. 1050

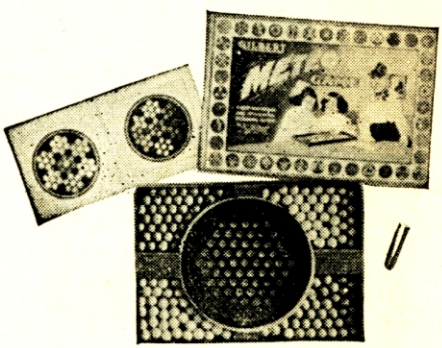
Gilbert Meteor Games

Gilbert Meteor Games are unique outfits of many colored marbles with which to build various designs on a metal design board included. They are fascinating toys that girls and boys surely enjoy. The thousands of designs you can form easily will surprise you. There's a whole bunch of marbles in a big assortment of colors with every set. By placing them on the jet black design tray you can produce some very attractive contrasts—form your initials, birds, animals, stars and so many things that it's hard to think of them all. Suppose you wanted to color something you had built with your Gilbert Designer and Toy Maker outfit, you could easily work out many combinations in miniature with one of these outfits until you found just the one that suited you.

Every set contains a dandy design book printed in full colors and giving you many suggestions to follow until you catch on to how best to use your set, and then you can think up any number of new and attractive designs for yourself.

No. 1050. METEOR GAME

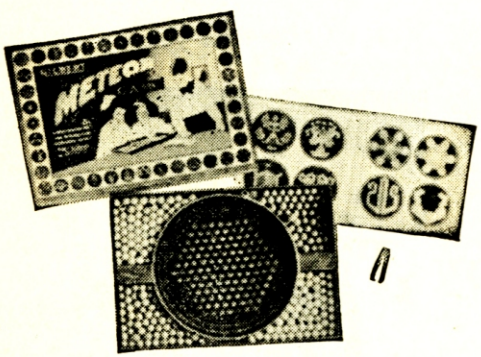
Especially for the younger boy. A dandy little set to start with. Comes packed in the Gilbert Toy sealed carton.



No. 1051

No. 1051. METEOR GAME

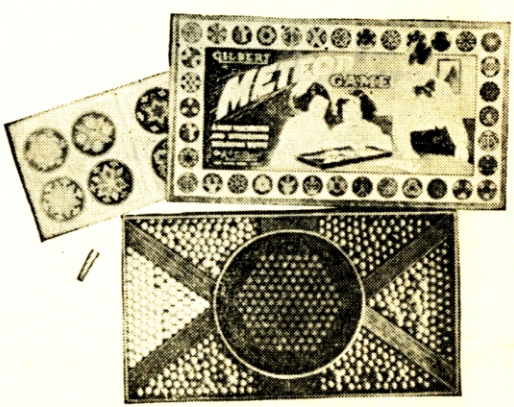
Contains a bigger assortment of colored marbles than No. 1050 and the colored design book. Packed in the distinctive Gilbert Toy sealed carton.



No. 1052

No. 1052. METEOR GAME

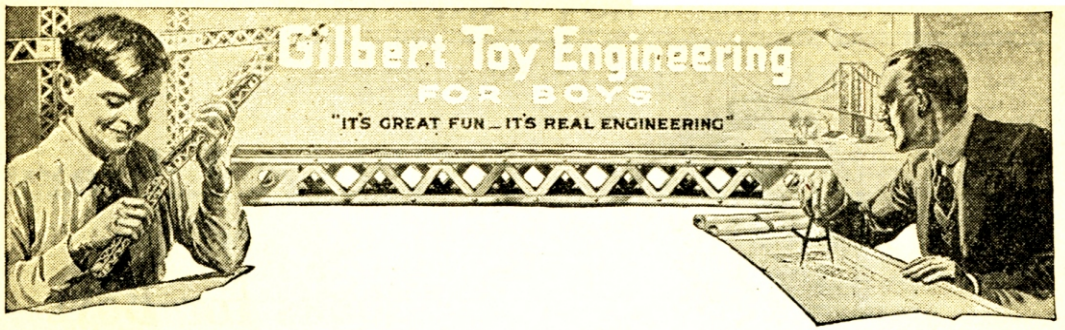
A still larger outfit with which to build larger and different colored designs. Dandy design book included. Packed in the standard Gilbert Toy sealed carton.



No. 1053

No. 1053. METEOR GAME

The largest of all Gilbert Meteor Games and a dandy. Contains a big assortment of the brightly colored little marbles, design book and metal tray. Packed in the Gilbert Toy sealed carton.



Hello Boys! REG. U.S. PAT. OFF

I know a great many of you who have read this book are members of the Gilbert Engineering Institute for Boys and know the fun there is in building models of different Gilbert Toys and winning the degrees, but there are a lot of boys who haven't become Gilbert Engineers, and to these boys I want to say they don't know what they are missing. I founded this Institute of Engineering just for boys so they could have the opportunity to win degrees, diplomas, etc., exactly the same as their older brothers are doing in big colleges all over the world. Only in this institute you don't have to go to school and do a whole lot of studying and hard work. You can get all the advantages of this right while you are playing.

Already some 20,000 boys all over the world are Gilbert Engineers. Many are Gilbert Expert Engineers, and a few very ambitious, live-wire boys are Gilbert Master Engineers. If you are not already a member of this big boy organization, you surely want to be right now. Just send me 10 cents to cover mailing and I'll send you the Credential of Membership giving full particulars.

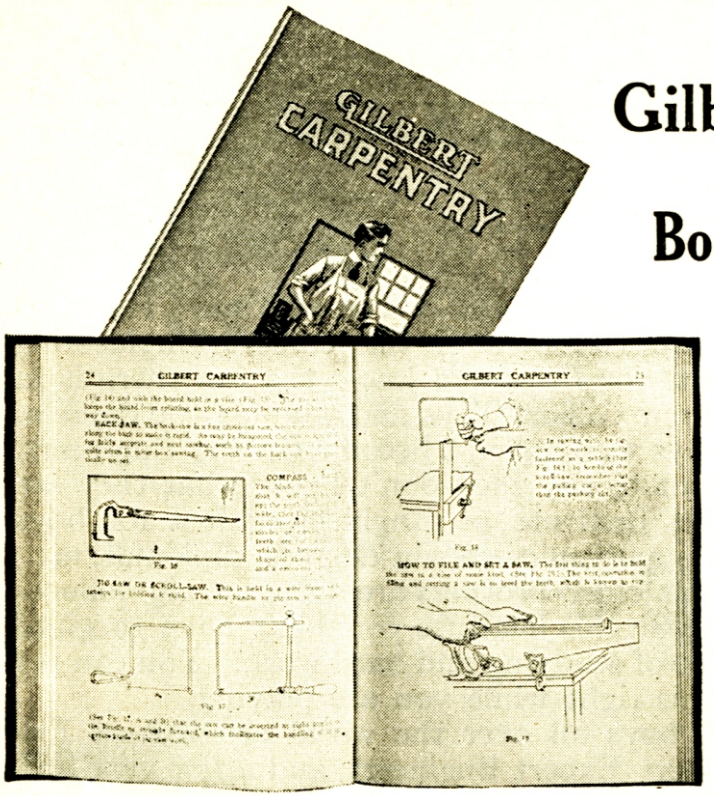
Gilbert Toy Tips

To keep this big army of Gilbert boys posted on what is going on in the Institute, I publish *Gilbert Toy Tips* every month. In this magazine I tell some of my experiences when I was a boy, articles on outdoor sports and athletics, tell you all about the new Gilbert Toys that are coming out and many other items of interest that I'm sure you will want to hear about. *Toy Tips* comes out once a month and I'll send it to you for one year if you will send me 25 cents to cover wrapping and mailing.

Yours sincerely,

The A. C. Gilbert Company
New Haven, Connecticut

A. C. Gilbert
President.



The Gilbert Library of Books for Boys

I remember when I was a boy that I couldn't find books that were written particularly so I could understand them. Of course, there were lots of story books, but I mean books on interesting sciences, in which I was very much interested; books on sports, or books on magic. I decided then, that if I ever could do it I would write books just for boys. And I wouldn't write them about dry, uninteresting things, but about modern, up-to-date things that I know every live-wire boy is interested in.

Boys, I've been able to do it! I've prepared a dandy library just for you boys! There's a number of volumes in it now and I'm adding to it all the time. Every book is written so my boy friends can understand it easily, and, best of all they are about things that are up-to-the-minute. A knowledge of lots of them will put you far in the lead of lots of your boy friends.

Right now in the Gilbert Library, there are books on:

Carpentry	Sound Experiments	Magic Coin Tricks
Hydraulic and Pneumatic Engineering	Civil Engineering	Magic Handkerchief Tricks
	Weather Bureau	Chemical Magic
Magnetic Fun and Facts	Signal Engineering	Knots and Splices
Light Experiments	Tin Can Toy Making	

You surely will want some of these books. They come in handy pocket size in two styles of binding. One with paper covers that looks like leather, at 75 cents per copy, and another style in full cloth binding for $1.50 per copy.

If you are unable to secure them in your city write me.

The A. C. Gilbert Company
New Haven, Connecticut

A. C. Gilbert
President