The Story of The Clocks

A Manual for

GILBERT

CLOCK SETS

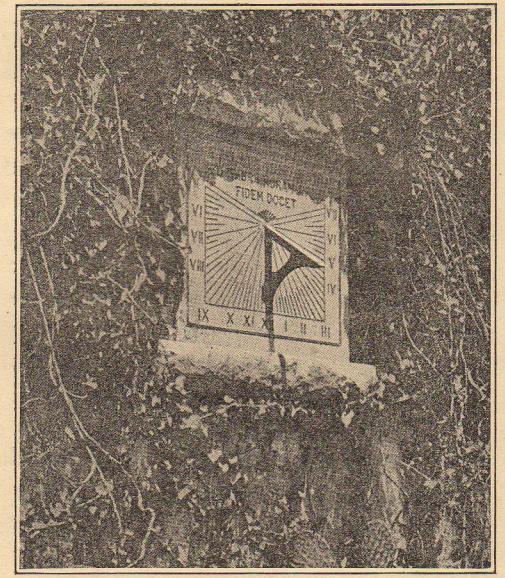
KLAX TOY

THE STORY OF THE CLOCKS

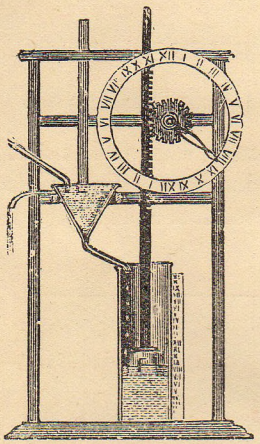
I. SUN DIALS

"What makes a clock run and tick?"

It is not very easy to answer what makes a clock run and tick, as there are and were so many clocks of various designs. I think the first and simplest form of a clock was the sun.



The savages must have observed the position of the sun, or rather the shadows of certain objects like rocks or trees or the peaks of mountains.



CLEPSYDRA

That gave them a crude device of telling time, but satisfactory for their purpose.

So we find that the observation of the sun was the first time teller and **Sun Dials** were known to all the ancient civilized people. The Chinese in the far east many thousands of years before other nations, like the Babylonions or the Greeks and Romans, just as well as the Indians in our country or the Aztecs in Mexico and South America used dials in various forms. We find them even now in use although more for ornament than a time keeper. They are not accurate as they vary with the position of the sun in different seasons and they mark "the sunny hours only" as we find inscribed on many of them,

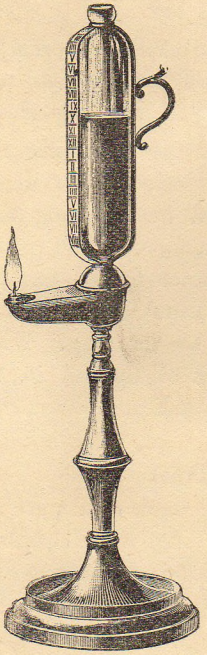
II. WATER CLOCKS

A step further in the development of time keepers are **"Water Clocks"** or named more exactly "water thiefs", **clepshydrae,** which is a Greek word meaning "stealing water."

In simplest form they consisted of two basins connected one below the other. The top one was filled with water that dripped into the bottom one indicating a certain length of time when the basin was emptied.

These water clocks became in time more complicated until they developed into mechanical masterpieces.

I remember reading about a delegation that came from Persia to Charlemagne around the year 800. They brought among a lot of curiosities a most complicated water clock made of bronze inlaid with gold and precious stones. This clock indicated the hours by means of little balls which fell out of twelve small doors. At twelve o'clock the figure of a horseman would drive around the dial and shut the doors while the balls were brought back in their original position. You see this clock told the time even at night by the sound of the falling balls.

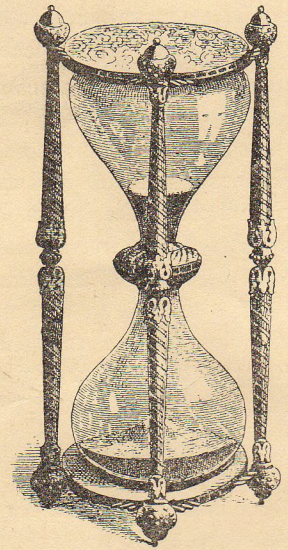


LAMP CLOCK

Water clocks were used for a long time and their construction developed in many ways so that they became water motors. Some of these would run in the same manner as our garden sprinklers, while others moved water wheels similar to our mills on the river. These rotating parts were connected to a train of gears and indicated finally on a dial the time of the day.

III. NIGHT CLOCKS

At the same time, an entirely different kind of time teller was



SAND GLASS

used, especially during the night time, the **Wick** or **Candle Clock** and the **Lamp time keeper.**

The wick clocks were made of flax or hemp with knots in them. When lighted, they would smoulder steadily and show the time by the amount of knots left.

The candles were marked to indicate the time they took in burning down.

Do you imagine that any clock of this design would be a fitting time piece for our bed rooms? The **lamp clock** had a container for oil that was usually marked with the hours from four o'clock in the afternoon to eight o'clock in the morning. When the lamp was lighted, the surface of the oil in the container, slowly sinking, plainly indicated the correct time during the night.

IV. SAND GLASS

Upon the same principle as the water clocks are the **Sand Glasses** built. You know what a sand glass is, because you find it in mother's kitchen as a timer for cooking eggs. The sand glasses were much in use especially to measure small periods of time and great care was exercised in preparing the sand.

V. WEIGHT CLOCKS

Up to this time you heard about devices that were used as time keepers but all of them like sun dial, water clock or sand glass were not dependable as absolute exact clocks. It was always merely guess work instead of correct time keeping. Not 'till the invention of the **Weight Clock** we had an instrument that could tell correct time during the day or the night.

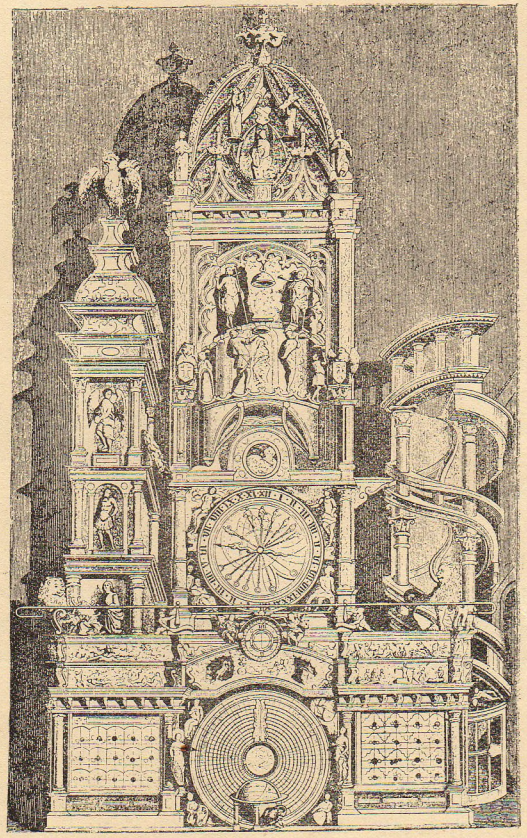
Not before the year 1400 there seemed to be a clock in use that would run by a weight and be governed by an escapement. The **Escapement or Anchor** is a device that prevents the clock to run off suddenly and regulates its speed. They were built in various designs. Often a speedily rotating fly was used as regulator, but mostly it consisted of a pendulum with a cross attachment that worked upon the gears of the clock.

When we consider the simple machines that were used by the old time clockmakers we have to admire their ingenuity. In many instances they spent a number of years in building one single clock and they produced real masterpieces. Do not imagine that such a clock looked like our Grandfather's clock when finished.

VI. THE STRASSBURG CLOCK

Let me describe to you one of the most wonderful clocks, built in that time. It is the Clock in the Cathedral of Strassburg in Alsace Lorraine.

This masterpiece of a clock was built in the 16th Century. It stands about 20 feet high and has more

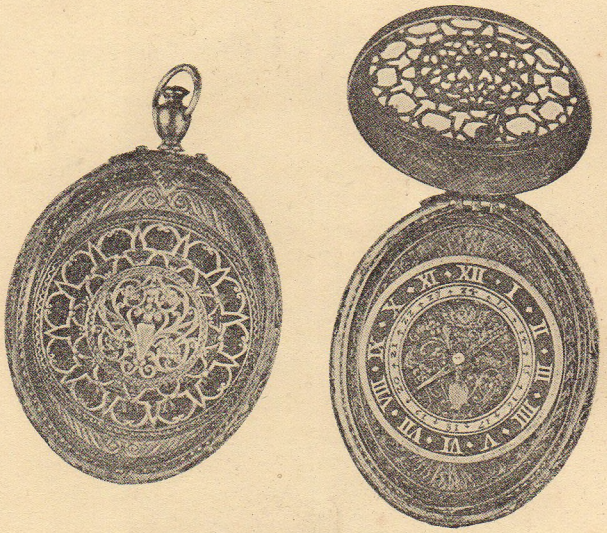


STRASSBURG CLOCK

OLD TABLE CLOCK

than 300 different mechanical actions, all of them depending upon the main movement of the clock. You find there represented the sun and the moon, and all stars known to that time.

A globe of the world is turning around its axle making one revolution every 24 hours. A calendar marking every day completes one revolution during the time of one year, indicating the exact date of the year. Wooden figures represent the saints, and many different animals carved of wood marked the signs of the eclipse. It



NUREMBERGIAN EGGS

would go too far to describe this wonder of ingenuity with its moving figures striking hours and quarter hours and all the many dials marking hour and day and month and years. Look at the picture of the clock and notice many more interesting details. I just want to call your attention to the cock perched on the top of the tower on the left of the clock which tower contains the mechanism of the clock and of the cock. This bird crowed at noon hour daily, opening his beak and flapping his wings.

This clock was constructed during the 19th century with slight alterations in the actions of the figures, although the movement had to be replaced by a new one.

VII. POCKET WATCHES

At the same time when the ingenious clockmakers spent nearly a whole lifetime building such marvels of ingenuity as the Strassburg Clock, they also had their minds working on time-keepers that could be carried around. So we fiind in the beginning of the 16th century the first portable timekeeper, first developing as **Table Clocks,** large clocks that would stand on the table, and later as smaller ones that could be used as fobs, and finally small enough to be carried in the pocket.

The honor of building the first pocket watch goes to a man who lived in Nuremberg, Peter Henlein. Henlein means chicken, and as the first watches were quite clumsy and oval shaped they were called "Nuremberg-ian Eggs."

These small portable watches did not depend upon any weight as the source of driving power but had a long ribbon of thin steel coiled around a spindle. This small movement is still used in our pocket watches.

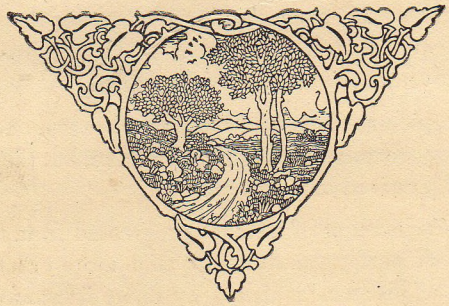
As the picture shows the early watches had one hand only, their movement was quite primitive, but they were beautifully carved and engraved.

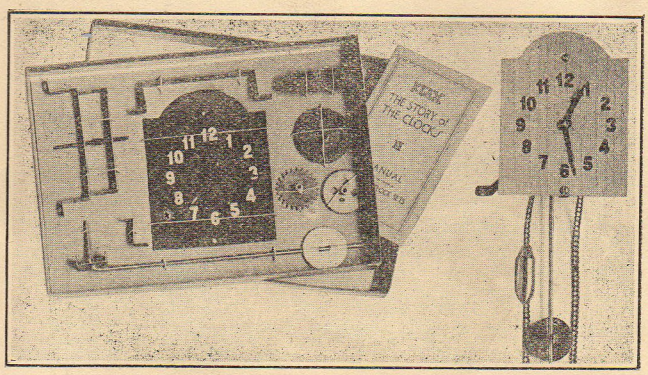
The development of watches progressed from now in the way of perfect movements and more exact time-keepers. This was achieved by many improvements, the most important of which is the use of jewels for bearings. Just consider the strain and wear on the axle and the bearings of the balance-wheel for instance,

which makes about 300 vibrations every minute or 18,000 each hour, 232,000 in a day or 158,000,000 a year. Without the jewel bearings, no watch could keep correct time.

I do not think I need to tell you what correct time in life means. Our life is regulated by the clock and every hour lost cannot be brought back any more.

In our country the making of clocks is not very old. Two or three generations ago, men like Eli Terry, Seth Thomas, or Walter Camp began the building of clocks in Connecticut and from a small origin an enormous industry grew that produces the most beautiful watches with the finest movements.





CLOCK SET No. 1

HOW TO ASSEMBLE CLOCK No. 1

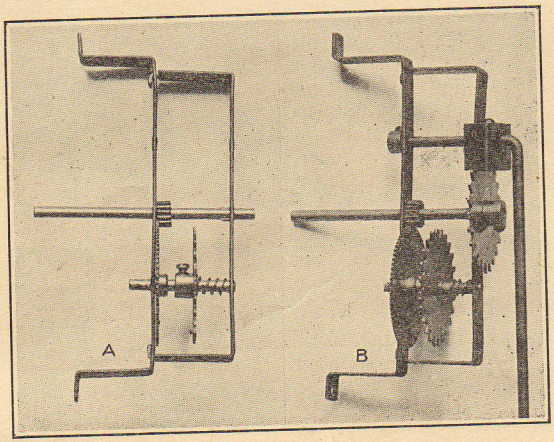
1. Compare the picture with your set, whether or not you have Set No. 1.

2. Take the 1½ inch axle out of the envelope and force it in the drive gear with the small teeth so that the swedged part of the axle is in the hub and the axle sticks out in front ¼ inch.

3. Slip the gear with the large teeth on the axle behind the first gear without tightening the set screw.

4. Place the spring from the envelope behind the second gear and force the axle in the frame by spreading the frame a little apart. See Fig. A.

5. Hold the end of the axle flush with the back part of the frame and tighten the set screw in the gear so that the spring pushing against this gear will force the front gear to mash with the pinion above. Now if you press against the front end of the axle, which sticks



out about ¼ inch, you disconnect the front gear from the pinion above. By releasing the axle, the gear should spring into its former position and engage the pinion.

6. Place the gear on the center axle and tighten by means of the set screw, seeing that the axle moves freely.

7. In the top holes of the frame place the anchor with the pendulum and tighten the set screw so that they form a right angle. In front of the pendulum axle put the collar and tighten the set screw, leaving free movement for the pendulum. See Fig. B.

8. Insert the back brace in the bottom of the frame and hold it in place by means of screw and nut from the envelope. Do the same with the hanger in the top hole of the frame.

9. Slip the chain over the back gear in the bottom so that the weight is on the left side, looking from the front.

10. Attach the dial to the frame by means of two screws and nuts.

11. Force the hour and minute hand upon the center axle in any desired position.

12. Hang the clock on the wall and see that it hangs down perfectly straight.

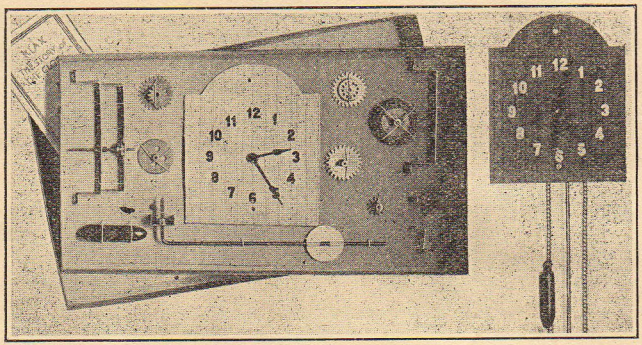
13. With the thumb of your left hand push the bottom axle in and pull with your right hand on the chain until you bring the weight up to about one inch from the clock.

14. Let the gear spring back in mash and your clock will start to run if you move the pendulum.

15. When you reach by experiment the position in which the clock runs best, drive two small nails through the holes in the back bracket to steady the clock.

16. The weight of the clock turns the main axle. The drive gear of this axle works upon a pinion of the axle above, that turns the hands in front of the dial. The escapement of the pendulum regulates the speed of the hands, allowing only a very slow movement.

17. If the clock, when oiled, should not run satisfactorily, try to increase the weight by adding some pieces of iron.



CLOCK SET No. 2

HOW TO ASSEMBLE CLOCK No. 2

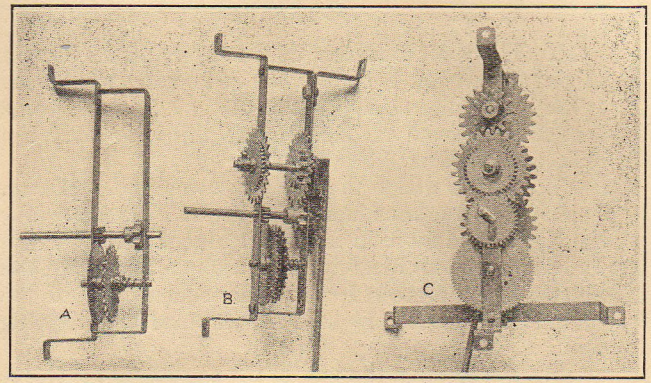
1. Compare the picture of Clock Set No. 2 with your set, whether or not you have set 2.

2. Take the axle, which is swedged in the middle, out of the envelope, and force it in the drive gear, the one with the small teeth, so that the swedged part of the axle is inside the hub, and the axle sticks out in front ¼ of an inch.

3. Slip the gear with the large teeth on the axle, behind the drive gear without tightening the set screw.

4. Place the spring from the envelope behind the second gear and force the axle in the frame by spreading it a little apart.

5. Hold the end of the axle flush with the back part of the frame and tighten the set screw in the back gear so that the spring pushing against this gear forces the front gear to mash with the pinion above. Now if you push the front end of the axle in, flush with the frame, you disconnect the drive gear from the pinion above. By releasing the axle the gear springs into its former position, and mashes the pinion. At the same time look out that the second gear will clear entirely the set screw



on the hub of the large pinion, when the axle is pushed back. See Figure. A.

6. Place the gear on the rear end of the main axle and tighten it by means of the set screw.

7. The next hole in the frame is the bearing for the pendulum. Push the axle of the pendulum through the back part of the frame. Slip on it inside of the frame the double gear, the one whose smaller gear has large teeth. Push the axle through the front of the frame, slip the double gear with the fine teeth on the smaller one over it. Place the collar in front and tighten the set screw, seeing that the escapement axle moves freely. See Fig. B

8. Tighten the pendulum axle and the anchor in a position that they form a perfect angle of 90 degrees.

9. Insert in the bottom of the frame, the bracket and hold it in place by means of screw and nut from the envelope. Do the same with the hanger on the top of the frame.

10. Take the axle with the swedged end out of the envelope. Slip it in the back end of the frame through the large gear inside and place on the front end the small gear and tighten them with set screws. See Figure C. The large gear inside the frame should mesh and hold in position the double gear below.

11. Slip the chain over the back gear, in the bottom so that the weight is on the left side from the front.

12. Take the tubing out of the envelope and force it in the gear with the fine teeth. Slip this over the main axle in front. See Fig. C.

13. Attach dial to the frame by two screws and nuts.

14. Slip the hour hand with the hub inwards over the tubing and force in front of it the minute hand with the hub outwards bending them if necessary so that the hands pass each other freely. The center part of the minute hand should prevent the hour hand from slipping forward.

15. Force upon the end of the pendulum the sleeve with the extension piece and the pendulum disc.

16. Hang the clock on the wall and see that it hangs down perfectly straight.

17. With the thumb of your left hand push the bottom axle in, clearing the pinions above at the same time pulling with the right hand on the chain until you bring the weight up to about one inch from the clock. Allow the gear to spring back into mash and the clock will start to run if you move the pendulum.

18. When you reach by experiment the position in which the clock runs smoothest, steady the clock by means of two nails driven through the holes of the back bracket.

19. The weight of the clock turns the back axle. The drive gear on the bottom axle works upon the pinion on the main axle above which turns the minute hand. The escapement on the pendulum regulates the speed of the clock allowing only a slow movement for the minute hand. The train of gears on the two axles above reduces the speed of the minute axle from one to twelve, so that the hour hand rotates twelve times as slow as the minute hand.

20. If the clock when well oiled should not run satisfactorly try to increase the weight by adding some pieces of iron.

Dear Boy Friends:

As I keep adding Toys to the big Gilbert Family, I try to add those which will furnish the most fun to all of my boy friends and at the same time teach them something worth while.

The Gilbert Clock Set is one of my latest additions. My Engineers have been working on it for a long time to produce an actual working Clock Set which will operate exactly like the real clocks and I know I have succeeded. You are going to have a lot of fun with this Set and it is going to teach you the mysteries of clock works, which will be valuable to you in after-life.

Cordially yours,

A. C. Gilbert

President.