THE NEW YORK CYCLE AND AUTOMOBILE SHOW

SOME NOTABLE EXHIBITS.

Among the many exhibits at the recent Madison Square Garden show were to be seen the two machines illustrated on this page, each of which will doubtless prove of interest to our readers.

One of these is the "Trimoto," of the American Bicycle Company—a little machine built somewhat on tricycle lines, yet having a wide enough seat to carry two persons comfortably. A general idea of this machine can be formed from our illustration. The 2¼ horse power air-cooled motor, together with the tank, carbureter, etc., are all hung on the front or motor wheel, where they can easily be reached. The machine is steered by the horizontal steering lever, and the speed is governed by turning the handle of the same. The motor is started with a crank, the steering lever being first raised about forty-five degrees. When the handle is lowered, the motor is thrown into gear with the front wheel by compressing a band brake. There is no low-speed gear or reverse. The motor is fitted with roller bearings and equipped with a much larger flywheel than is generally used with motors of this type. The flywheel and gears are on one side of the front wheel, the motor being on the other, and the wheel is so well balanced that it will stay in place if the hands are removed from the steering lever. The carbureter employed is constructed on the atomizer principle, and hot air is conducted to it through a pipe which ends in a flange that partly surrounds the cylinder. Electric ignition has replaced the hot tube igniter with which the machine was originally equipped. The gasoline tank has a capacity of 1½ gallons. The lubricating oil is kept in a small tank adjoining the gasoline tank.

The "Trimoto" weighs 400 pounds, and can make 12 miles an hour over average city or country roads.

Now that the bicycle has reached its probable final design in the chainless bevel gear machine of 1901, it is interesting to note any further attempts at improvements, even though they prove abortive. Many of this year's bicycles are equipped with cushion seat posts; and spring suspension saddles, somewhat on the lines of the Kirkpatrick used on the early Columbias, were also to be seen at the recent cycle show.

These attempts at reducing unpleasant vibrations on the standard models are worked out in a different way by the inventor of the "freak" wheel here pictured, which was the only machine of its class on exhibition. The inventor, who hails from Jericho, N. Y., claims much less vibration to the arms through the lever extensions of the handle bar. Their main purpose, however, is to afford a means of propelling with the hands as well as the feet in ascending hills, the upward pull usually exerted on the handle bar being here applied directly in helping to rotate the pedals. The machine is steered by the thumbs, which operate the two small loops on the handles of the levers. These loops are connected to the steering head through a short handle bar, and move the front fork without moving the cross bar to which the levers are attached.

In operating this machine the rider exercises his arms as well as his feet; he is obliged to sit erect, and to bring all the muscles of the body into play as the latter sways slightly from side to side. So completely are all the muscles developed that not only do the toes pedal, but even the thumbs are trained to steer! For an all round out-of-door exerciser this Yankee invention certainly cannot be surpassed!

As for the pull by the arms in climbing a hill, although applied direct in a rotative effort, it is applied under the disadvantage of having the arms bent at the elbow at a constantly changing angle, instead of being straight, as in ordinary hill climbing. It is doubtful if this arrangement, although good exercise for the muscles of the arm, will develop the maximum power.

A FOOT AND HAND PROPELLED BICYCLE.

A GASOLINE "TRIMOTO" VEHICLE.

SUBMARINE SIGNALING.

BY ARTHUR J. MUNDY.

When the idea of a submerged signal first occurred to the writer he foresaw that he would be unable to develop it properly without the assistance of some master mind accustomed to wrestle with nature for her secrets. He therefore invited his friend, the late Prof. Elisha Gray, of telephone fame, to join him in the undertaking, and received in reply an enthusiastic acceptance. Prof. Gray brought to the subject a wide knowledge of the laws of acoustics in their relation to electrical science, which has enabled him to overcome difficulties that have heretofore seemed insuperable.

An experimental boat christened the "Sea Bell" was built and equipped with an 800-pound bell to be operated electrically, the necessary power being supplied by a small dynamo driven by a gasoline engine. This bell is lowered into the sea through a well-hole directly in the center of the boat until it is twenty feet below the surface. By an ingenious mechanism it may be either tolled continuously or made to ring any desired number or numbers, at the will of the operator, who is thereby enabled to send intelligible messages, each letter of the alphabet being represented by a given number.

The sound thus produced under water may be heard from a passing ship at a distance of, say, a mile or more, provided the observer go below in the hold of the vessel as close to the keel as possible and listen, just as he would listen for an air signal on deck. The sound waves produced by the bell come through the water and penetrate the skin of the ship, diffusing themselves in the atmosphere of the hold, where they are recognized by the unaided ear, just as any local sound might be. The sound is heard more plainly, however, by placing one end of a wooden rod against the skin of the ship, and pressing the other end against the outer ear.

A common tin ear-trumpet, such as is used by a deaf person, screwed into the end of a piece of gas pipe and submerged a few feet, the mouth of the trumpet being sealed with a tin diaphragm, will enable the observer at the upper end of the pipe to hear the bell a distance of three miles.

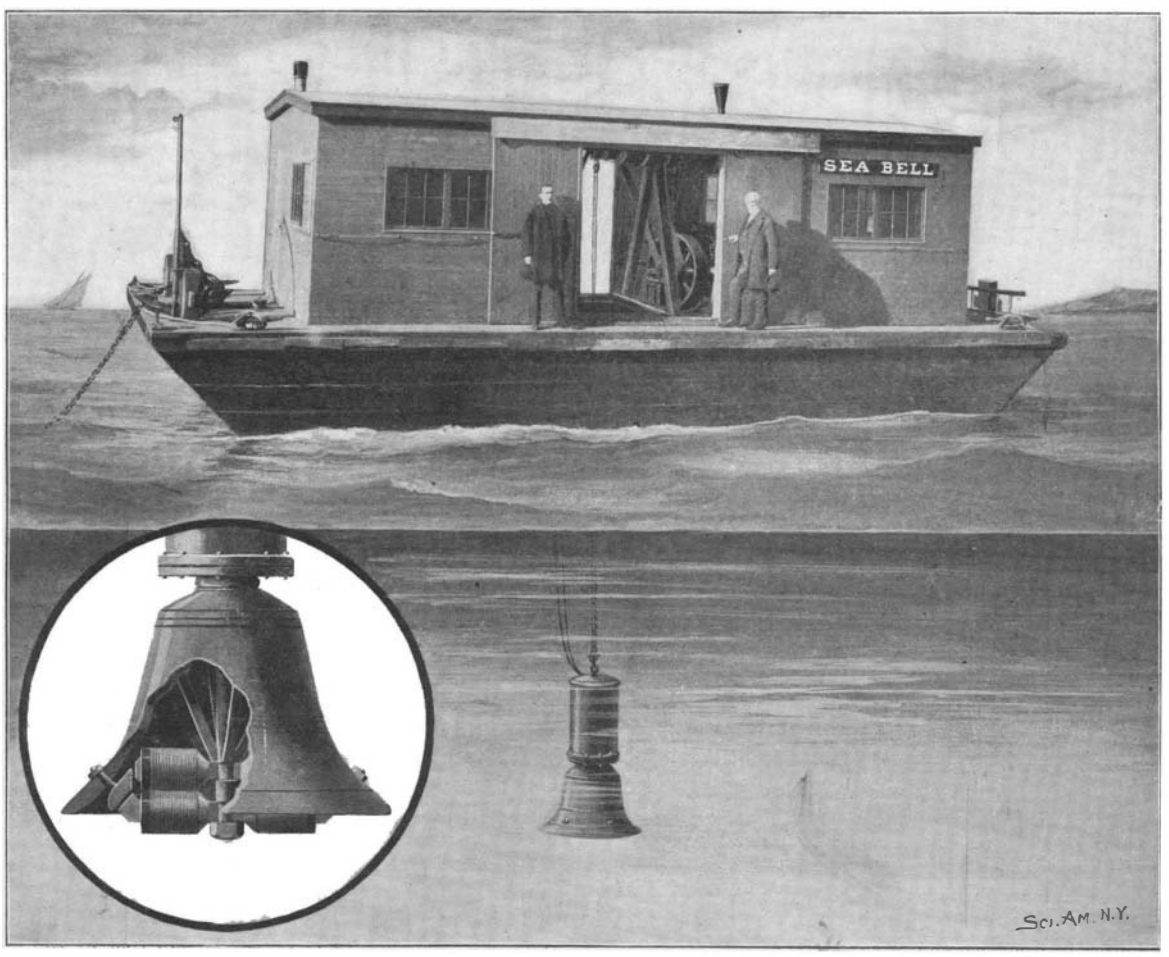
For greater distances Prof. Gray invented an electrical sound receiver. From this submerged instrument a connection is made to any part of the ship—say, the pilot house—where the navigator will listen for the sound through an ordinary telephone receiver.

A practical test of this apparatus was made on the last day of the century just ended. Several gentlemen were invited to witness the results accomplished. Among those present were Mr. Henry M. Whitney, who has given the enterprise his hearty support from the start; Prof. Wallace C. Sabine, of Harvard, an expert in acoustics; and Commander Arthur P. Nazro, U. S. N., Lighthouse Inspector. The "Sea Bell" was anchored in the open sea off Winthrop Head, near Boston Light, and the steamer having the party on board proceeded seaward. These gentlemen testified to having heard the submerged bell.

At 1½ miles the sound of the bell was very loud and very distinct; at 4 miles the sound was quite as distinct and almost as loud as at 1½ miles; at 8 miles the sound was quite as distinct as at 1½ miles and almost as loud as at 4 miles; at 12 miles the sound was heard at times quite distinctly, and at times somewhat feebly. Even at 12 miles the sound received was sufficient to give a practicable warning signal. It has been thus demonstrated that sound may be produced in the water at a given point and picked up electrically at any point within a radius of twelve miles.

It is now proposed to install a practical working station for the use and benefit of shipping entering and leaving Boston Harbor, in order that the great utility and value of the system may become known. Two bells, of different pitch, will be anchored one on either side of Boston Light, 50 feet below the surface of the sea. These bells will be, say, five miles apart, and each bell a mile or more from shore.

The bells will not be suspended from boats as here shown, but from submerged buoys, holding them up, and anchored to moorings holding them down, so that their position will be fixed and unchanging and properly charted. The electric power for ringing them will be supplied by insulated cables from the shore. They will be rung automatically from the power house at regular intervals, just as a flash-



SUBMARINE SIGNALING.

light is operated in a lighthouse. They will be rung simultaneously at the beginning of each minute, and at the end of 20 seconds bell No. 1 will sound one stroke, and 20 seconds later bell No. 2 will sound two strokes, each bell thus declaring its identity.

Prof. Gray invented an electrical receiver to determine the direction of the origin of the sound. It therefore becomes a simple task to draw two lines on the chart at the ascertained angles, one from each charted signal bell, and where these two lines intersect there will be the position of the ship.

Prof. Gray invented an improvement by means of which his electrical receiver operates automatically a gong in the pilot house whenever the ship comes within a given distance of one of the submerged bells. Thus a submerged bell placed near a dangerous reef would set up an automatic alarm on board any ship thus equipped the moment she came within the radius of danger. This device would have saved countless lives and thousands of vessels which have been lost by getting out of their course and going to destruction when their commanders were off their guard, because they thought themselves perfectly safe.

It is, of course, obvious that vessels equipped with both sound-producing and sound-receiving apparatus may avoid collision, and send and receive intelligible messages to and from each other when they meet at sea. Also that lightships may be put in communication with shore stations, and that vessels passing along the coast may likewise send and receive messages to and from the shore.

Gray and Mundy patented a bell which is rung electrically, but without being struck percussively. Nothing touches it as it hangs motionless in either the air or water, but by depressing a common Morse key an electric circuit is made, which sends an alternating current to electro-magnets contained in the cavity of the bell, as shown in the detail view, and the magnetic lines of force thus created vibrate the bell continuously as long as the current is maintained, causing it to sound forth like a great organ pipe, but with tremendous power.

The successful ringing of a bell by this method depends upon sending precisely the proper number of impulses to the electro-magnets, and this in turn depends upon maintaining an absolutely uniform rate of speed in the motor driving the generator. The slightest change of speed will silence the bell. Prof. Gray could find no governor sufficiently sensitive to hold the speed uniformly to the rate called for by the fundamental tone of the bell; he therefore invented a device for this purpose. It is efficient and simple.

VIII. MERCURIAL BAROMETER.

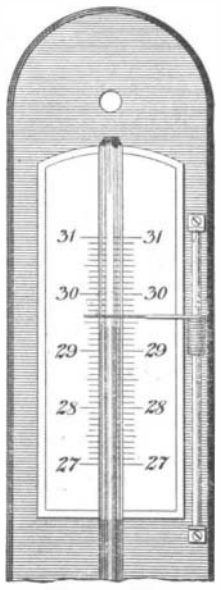
BY GEORGE M. HOPKINS.

The variations of atmospheric pressure are shown by the barometer. The pressure of the air in round numbers is 15 pounds per square inch; that is, a column of air 1 inch square, the height of the atmosphere (which is not positively known), weighs 15 pounds, and will balance a column of water 1 inch square and 34 feet high, or a column of mercury 1 square inch in area and 30 inches high.

A mercurial barometer is here shown on account of facility of construction and the accuracy of its operation. To make the simplest form of mercurial barometer, a strong glass tube a little more than 33 inches long and about 3-16 inch internal diameter is required. It must be sealed at one end, and left open and contracted to ⅛ inch at the other. This work is readily done by a glass blower. The open end is fused to remove the sharp edges. A small glass bottle is provided, the body of which is about 1 inch internal diameter and 1½ inches high. The neck is short and a little larger internally than the outside of the tube A board ⅞ inch thick, 3 inches wide and 39 inches long has a shallow half-round groove to receive the glass tube, and two brass straps extend over the tube and are clamped to the board by means of screws. Near the bottom of the board a hole is cut for the glass bottle or cistern, as it is called; a small shelf is secured by screws to the back board, even with the lower side of the hole in the board. A small hole is made in the back board near the top to receive the nail or screw upon which the instrument hangs.

Of course all the parts will be tried in place before attempting to fill the tube with mercury.

The tube must be perfectly clean, and only re-distilled mercury should be used. In the bottom of the glass bottle is placed a layer of pure beeswax 1-16 inch thick. The wax is made smooth and level by melting it by gently heating the glass bottle over an alcohol or Bunsen gas flame. When the wax is cold the filling of the tube with mercury may be proceeded with. The tube and the mercury are first warmed by passing them over an alcohol or gas flame; then mercury is poured into the tube through a small paper funnel. The tube should be filled to within ½ inch of the end with mercury. Then the clean, dry forefinger is held over the open end of the tube and the tube is placed in a horizontal position and tilted one way and then the other, to allow the bubble of air to gather up as much as possible of the air contained in the tube. The tube is then placed open end up and entirely filled with mercury. It is then inverted while it is kept closed by the finger. The end of the tube is placed below a body of mercury in a suitable vessel and a little of the mercury is let out so as to produce a partial vacuum at the top. Then the tube is closed and again turned into a horizontal position and tilted in one way and then the other, and at the same time turned or rolled over so as to cause the bubble to gather up any air

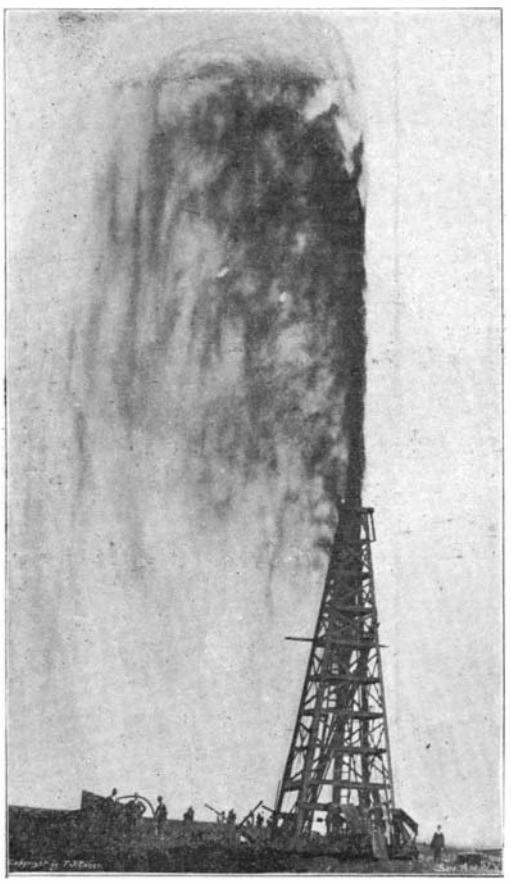


SCALE AND INDICATOR.

MERCURIAL BAROMETER.

that may remain. The tube is again inverted and filled, until it is entirely full of mercury. The finger is again applied, and a vacuum is produced by allowing a small amount of mercury to escape, when the tube is vertical as before. It is closed and tilted, allowing the bubble to again gather air. This operation is repeated two or three times. The tube is finally inverted and filled with mercury, so as to present a convex surface above the open end of the tube. The glass bottle containing the wax is placed over the open end of the tube and pressed down, causing the wax to make a good contact with the end of the tube.

The bottle is held firmly in place by the finger, and



THE BEAUMONT OIL WELL.

the bottle and the tube may now be inverted together, and after putting a little mercury in the bottle, the latter may be placed on the shelf prepared for it, and the tube may be raised a little, so as to clear its open end from the wax, and the tube is fastened in place by clamping it with the brass strips and screws. More mercury is added to that in the bottle so as to make the depth about ¾ inch above the lower end of the tube. A quantity of clean cotton wool is placed in the mouth of the bottle around the tube, to exclude dust, at the same time to admit air freely. The barometer is now finished with the exception of the scale.

A scale of inches ¾ inch wide and 4 inches long is laid out in the center of a card 2½ inches wide and 6½ inches long. Each inch is divided into tenths, and the divisional lines for the inches and half inches are extended beyond the ¾ inch limit. The beginning of the scale is numbered 27. The upper end of the first inch is numbered 28, the second inch is numbered 29, the third inch 30, and the fourth inch 31. The scale is placed behind the tube and the division line corresponding with the line at the top of the mercury in a standard barometer is placed in the same position relative to the mercury, and fastened by small tacks.

To enable the observer to mark the neight of the column of mercury, so that he may compare the present observation with the previous one, an indicator is provided, which consists of a rod supported by posts attached to the board, and a short section of spiral spring placed on the rod, with the upper extremity straightened and extending over the barometer tube. This end of the wire is flattened by hammering to make a more delicate index.

In a general way the changes of the barometer are given, but they must be taken with some allowance. High winds and storms usually follow the sudden drop of the mercury. The rising of the mercury generally indicates fair weather; the drop of the mercury indicates bad weather. The fall of the mercury in sultry weather is followed by thunder; the rise of the mercury in winter indicates frost. In frosty weather the fall of the mercury precedes a thaw, and the rise is followed by snow. Sudden changes in the barometer indicate similar changes in the weather. Continued foul weather may be expected if the mercury falls slowly; on the contrary if it rises slowly continued fair weather may be looked for. Changeable weather is indicated by an unsettled barometer.

It is perhaps unnecessary to caution the maker of the barometer to conduct the various operations of filling and adjusting above a large platter or piece of smooth paper, with the edges turned up to avoid unnecessary waste of mercury.

THE BEAUMONT OIL WELL.

The well at Beaumont, Texas, has the reputation of being the largest "gusher" yet located in the United States. It is estimated that fully 150,000 barrels of oil escaped from it before the flow could be controlled. Already a large territory in its vicinity has been sold to oil companies, and it is probable that the country between Beaumont and Corsicana will be thoroughly exploited within the next year by prospectors.

The well was struck on January 10, 1901, by Capt. A. F. Lucas, a geologist, of Washington, D. C., who has been prospecting for oil in this section of Texas for about two years.

While the men were at work on the derrick they noticed a commotion in the well, and hastily retiring had no sooner reached a safe distance when the well burst with a terrific noise, and 600 feet of four inch iron pipe was shot from the well and sent 600 feet into the air. The pipe was followed by hissing gas and oil which spouted 150 feet into the air. Almost immediately the stream settled down to pouring out pure oil, and from that time until the evening of January 16 the solid stream of oil continued to pour without a particle of diminution into the air. On January 18 the flow of oil was well under control. It fell to ground in a mist and ran off in a small river into a ravine or valley below, where it formed a lake which was ultimately overflowed and the oil continued down the regular watercourses to the Gulf of Mexico. The stream of oil is six inches where it issues and spouts fully 150 feet high in a solid body, then sprays. Experts have estimated that it flowed 20,000 barrels of oil every twenty-four hours. The oil has a specific gravity of about 24 degrees and is a good lubricating grade.

The mayor of Toledo said in relation of this well to the oil industry, after an examination of it:

"I think it the greatest oil well ever discovered in the United States. It is fortunate, for the oil trade, that it is not illuminating oil. If it were it would paralyze the entire industry. Its advent, however, means that liquid fuel is to be the fuel of the twentieth century. Smoke, cinders, ashes and soot will disappear along with war and other evidences of barbarism. The new oil well means a cleaner as well as a better civilization.

"Practically the only market for it is for fuel and road making. Texas should use millions of barrels for the latter purpose. Both these markets, however, must be created, and this means that before a market can be established two things must be demonstrated beyond question: first, that there is a great area of oil-producing territory and that the supply is inexhaustible, and this can only be done by drilling many wells; second, after the fact of the existence of the territory is demonstrated, it will be necessary to secure the confidence