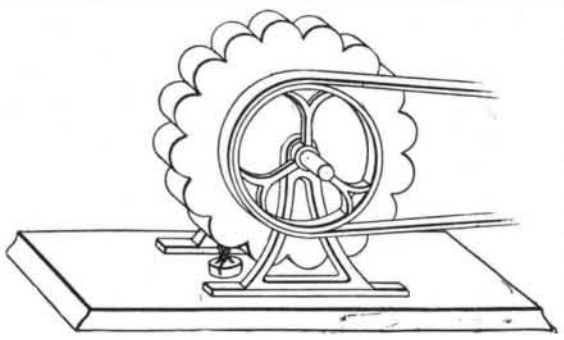
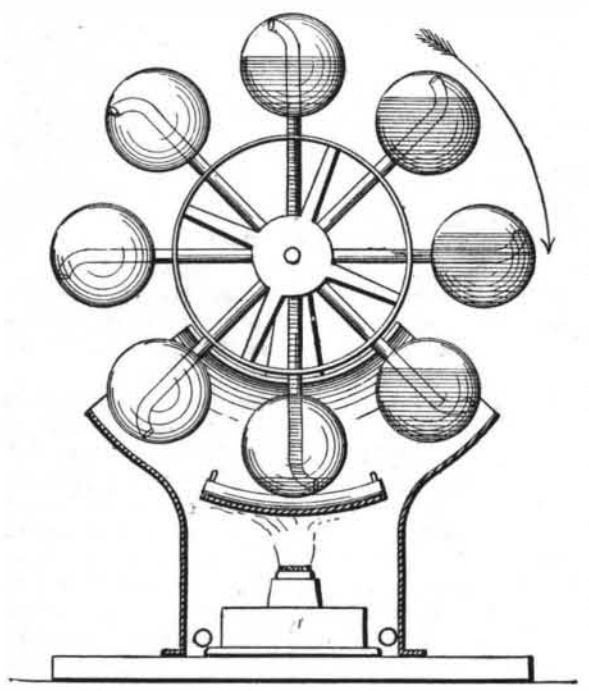
A NOVEL MOTOR.

Mr. Frank Mitchell, of "Bouchon" Works, Redman's Road, E., has patented and perfected an ingenious form of heat motor, which promises to be of great utility in those cases in which small motive power at a trifling cost, involving but little care or attention, is required. This motor consists essentially of a wheel mounted on trunnions. The wheel is hollow and divided into a number of compartments, which are filled with water or other vaporizable fluid, and sometimes charged with a volatile body. The opposite pairs of compartments are connected together and the whole is permanently sealed up. Since no chemical change takes place, one charge is sufficient to last for years of constant work, the wheel being, to all intents and purposes, a solid one.

To set the motor in action, it is sufficient to expose one side of the periphery of the wheel to the sun's rays, to a feeble gas jet, or even to the heat evolved by the human hand held near it. No condenser or any other device for concentrating the sun's rays is needed, and provided the heat be kept constant, no governor is required to insure regular speed. The application of heat on the one side causes a variation in the pressure of the fluid or vapor in the chambers, and this, by upsetting the equilibrium of the wheel, causes it to rotate with considerable force, which is proportion-



MITCHELL'S HEAT MOTOR—ENGLISH PATENT.



ISKE'S HEAT MOTOR—AMERICAN PATENT.

ate to the difference between the heat applied and the normal temperature. One great advantage in this motor is the absence of all risk, and this, conjoined to the fact that it runs perfectly silently and without dirt, is a grand recommendation. A small motor, standing but a few inches in height and actuated by the heat from a common gas burner flame turned down to the size of a small pea, will work a small fan or fountain, etc. I present your readers with an illustration of this novel device, which, in point of durability, promises to be the most durable motor extant.

By this invention Mr. Mitchell has at last solved the problem of obtaining power direct from the sun. The apparatus, when arranged as a sun motor, requires no attention. The enormous advantages this will offer for ventilating and other purposes in countries where the sun's heat is so intense will be obvious.

S. R. BOTTONE.

[The above article, from the *English Mechanic*, does not explain the construction of the motor. We are inclined to think it is similar, if not exactly like, a motor patented by Mr. Albert Iske, of Lancaster, Pa., in 1888. We annex a cut of Mr. Iske's motor and also give an abstract of his description of it.

In this motor bulbs are arranged diametrically opposite each other, in pairs, each pair being connected by a tube. The motor thus formed of the series of bulbs, the tubular arms and the shaft supporting them is operated by the heat of a small lamp. Each pair of bulbs contains enough water to fill one of them. The wheel thus formed revolves over a deflector which is heated by means of the lamp. The bulbs are exhausted of air, so that pressure sufficient to force the water from the bulb at the lower part of the wheel into the bulb at the upper part of the wheel is created by a very slight increase in temperature. The water being thus forced into the upper bulb makes the upper portion of the wheel heavier, thus causing it to turn by its own gravity in the direction indicated by the arrow, bringing the next filled bulb into position for being heated. This operation is repeated as the wheel continues to revolve.—*Eds.*]

The New Naval Observatory Telescope.

The new telescope for the Naval Observatory at Washington has recently been completed by Warner & Swasey, of Cleveland, O. It is entirely new, with the exception of the fine twenty-six inch object glass, and in power is second only to the Lick in this country and is excelled by but two telescopes abroad.

The old mounting for the lenses was built no longer ago than 1870, at a cost of $20,000, but such a revolution has been wrought in appliances and mechanism for handling large telescopes since then that it was necessary to construct a mounting entirely in the new style in order to have the telescope in keeping with the other instruments in what is to be the finest national observatory in the world.

The new telescope will weigh thirty tons, about two-thirds of which comes from the cast iron rectangular supporting pier, in which is built the great clock for driving the telescope in either stellar, solar, or lunar time. By it the star under observation is kept in exactly the center of the field of vision for hours at a time, and it is possible to leave a photographic plate exposed three or four hours with the same results as if the tube and star alike were stationary.

The tube itself is of sheet steel, 38 feet long, 26 inches in diameter at the object glass, 31 at the center, and 24 at the point where the eyepiece is placed. The sheets vary in thickness from one-tenth to one-twelfth of an inch, and have been carefully tested, with a view to bearing all the strain put upon them and maintaining a perfect tube. There is no ornamentation, by polishing or otherwise, except plain black paint. The weight of the tube is 2,000 pounds.

The telescope is equipped for photographic and spectroscopic work and is very complete in all its appliances. One observer will be able to handle the great instrument easily and quickly, so fine and perfect are the adjustments and machinery. The difficulty met in observing a star when it is low in the heavens and the eyepiece is brought high above the floor is overcome by raising the floor by hydraulic rams. The observer touches an electric button in a keyboard by his side and raises or lowers the floor at will.

The clock is wound automatically by electricity. When the weights reach a certain point they switch on an electric current, which is cut off again when they are wound up.

The ease in handling the telescope is increased by the devices to reduce friction. The shaft of the polar axis rests on hardened steel ball bearings resembling those in fine bicycles, and at the top it works on a necklace of anti-friction rolls.

The Siren as a Fog Signal.

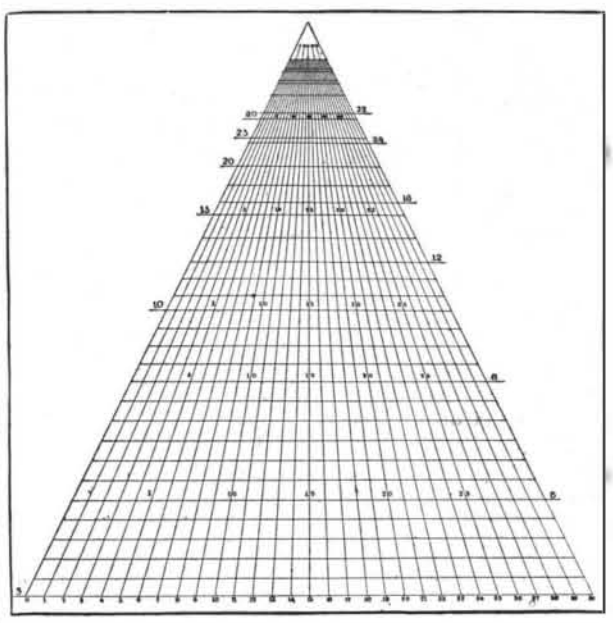
Undoubtedly the siren is one of the best fog signals. Its penetrating, though exceedingly disagreeable, note can be heard farther than any other sound, except, perhaps, an explosion, and it can be given any desired characteristic. Yet of the 255 fog signals of various kinds in the United States, not including whistling and bell buoys, but 18 sirens are now in use. The reason is the expense. There is but one firm in the world that makes them, so this firm has the monopoly and charges accordingly. It is justified in so doing, however, as it spent a great deal of money in perfecting this instrument.

A siren is a simple enough instrument. It consists of two superposed disks, with a certain and like number of holes. One disk is stationary, the other revolves, while at the same time air or steam is forced through the holes. When the holes are opposite each other, the steam will pass; when they are not opposite, the passage of the steam is stopped. Hence when one of the disks revolves, the steam passes in a series of puffs. If these puffs succeed each other with sufficient frequency a note is produced, rising in pitch with the rapidity of revolution and increasing in power with the pressure of the steam. In the present siren the disks are revolved by a small steam engine, which also opens and closes a valve to allow for the passage of the steam, and thus gives what is known as the characteristic, for a siren used as a fog signal does not sound continuously, but gives a certain number of blasts of a definite length per minute. The steam is supplied by a boiler both for the engine and the siren, and, to avoid possible breakdowns, the boilers, engines, and sirens are always in duplicate. The steam pressure is ordinarily about 50 pounds, and the sound can be heard from ten to fifteen miles, and occasionally much farther, depending on the weather.

The same firm which makes the sirens makes also a very much cheaper and nearly as effective an instrument known as the "self-acting siren," which requires no engine and which is much used on the transatlantic steamers in place of steam whistles. The steam itself revolves the disks, and the blasts are given by simply opening the valve by hand. The speed of revolution of the disks is automatically regulated by an ingenious centrifugal brake. A self-acting siren would make an admirable fog signal if it could be given a characteristic automatically. This is accomplished by the use of "Crosby signal," a clockwork device, which can be set to automatically open the steam valve any definite number of times per minute, the clock being also wound up automatically each time the siren is blown. One of these fog signals has lately been installed at Execution Rock light station, Long Island Sound. It consists of two locomotive boilers with their accessories, two self-acting sirens, and two Crosby signals, so arranged that either boiler and either Crosby signal can actuate either siren. The sound has been heard a distance varying from eight to seventeen miles. The cost of a first-order siren in duplicate, without boilers, is $4,800. The cost of the self-acting siren and Crosby signal in duplicate, without boilers, is $925. The Crosby signals are manufactured by the government, the light-house board having bought the patent.—*Marine Review.*

THE UNIVERSAL SCALE.

The scale by J. Ernest G. Yalden, 144 West 94th Street, New York, consists of a triangle having a base of 6 inches and an altitude of 6 inches. The base is divided into 30 parts. These parts are connected with the apex of the triangle by radial lines. Lines parallel to the base are drawn through the triangle, to enable one to hold parallel to the base the paper on which the divisions are to be taken.



THE UNIVERSAL SCALE.

To divide a line of unknown length into any number of equal parts:

Mark on the edge of a strip of paper the length of the line as taken from the drawing. Let us suppose it is to be divided into 12 parts. Fit it between the 0 and 12 radial lines on the scale by sliding it up and down till it fits, keeping the edge of the paper parallel to the base of the triangle. Mark the 12 parts, and then apply it to the drawing, using it as a scale.

This is far more accurate than the usual method of drawing parallels from points on a line drawn through one end of the given line. It takes far less time and does not deface the drawing. The draughtsman can construct in like manner a scale to fit any case, and which may be used in the same manner as a scale. Other applications will be obvious.

Rupture of Intestine Caused by a Tapeworm.

In a recent number of the New York *Medical Journal*, Dr. Fayette Dunlap describes a case of resection of the small intestine for rupture caused by a tapeworm. When he saw the patient he believed that there was an ectopic gestation with ruptured sac. On the abdomen being opened the pelvis was seen to be filled with recent blood-clot, and a tapeworm was found protruding from a large ragged rupture in the small intestine. About two-thirds of the lumen of the intestine was gone, the edges were ragged and gangrenous, but it was quite evident that there had been no previous ulceration. The damaged part was resected and the ends united by the continuous suture after the manner of Lembert. Vomiting was continuous for thirty hours after the operation and only ceased after a large enema of an ounce each of glycerine and sulphate of magnesium and a quart of *hot* water. From the abdomen there was removed about eight feet of live tapeworm, and with the enema there came away seventeen feet more. Dr. Dunlap thinks the worm had become entangled, and in the effort to free itself so eroded the wall as to cause rupture. No antiseptics were used. The patient made a good recovery.