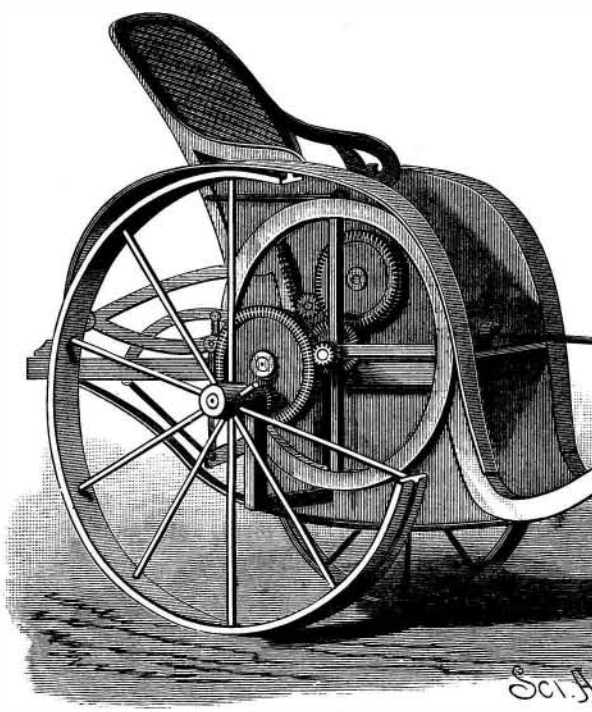
AN IMPROVED TRICYCLE.

A tricycle which is designed to be easily and conveniently propelled at a high rate of speed, without much exertion on the part of the operator, is shown in the accompanying illustration, and has been patented

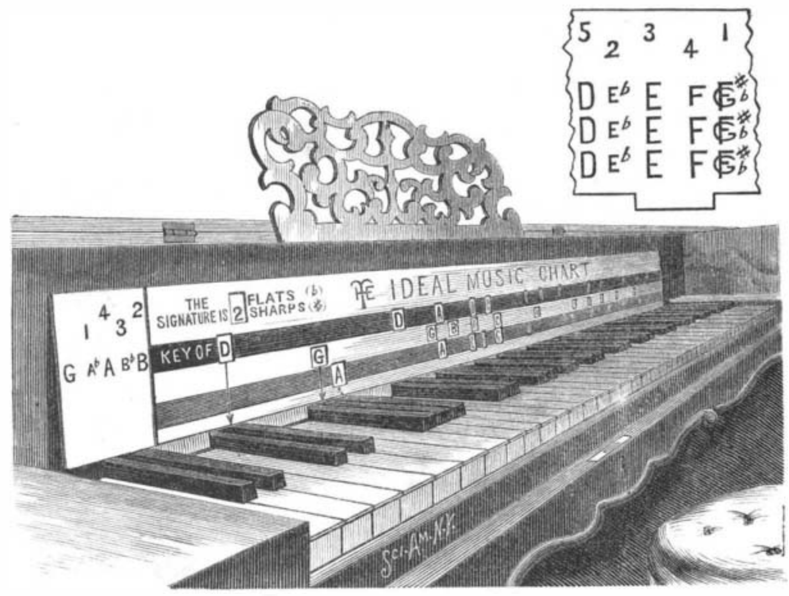


FRIE'S TRICYCLE.

by Mr. Hermanus T. Frie. It consists of a rocking chair located on a suitable frame and operating at its free end on a segmental gear wheel, connected by a train of gear wheels with the axle of a driving wheel. Of the two main driving wheels, one is loosely mounted on a spindle from the frame, and the other is secured on a shaft rotating in bearings on the frame, the inner end of this shaft carrying a gear wheel which meshes into the internal gear of a wheel that is externally geared to mesh into a pinion loosely mounted on the shaft of a fly wheel. This loosely mounted pinion is connected with a clutch held on the end of an arm pivotally connected with one of the spokes of the fly wheel. A segmental gear wheel fulcrumed on the main frame has on its upper end an offset, on which rests a pin projecting from the upper arm of the rocking chair, the runners of which have in their bottom edges each a V-shaped groove, to fit on the V-shaped top edge of a longitudinal bar secured to the main frame. To prevent the runners of the rocking chair from jumping the longitudinal bars, rollers are provided connected with each other on each side by rods, the rollers traveling on the lowest or contact points of the runners of the rocking chair. The lower end of the segmental gear wheel is pivotally connected by a link with the rear end of a foot lever, carrying at its front end a foot piece operated on by the foot of the operator seated in the rocking chair. The train of gear wheels and connected parts are preferably covered by a hood, and the steering wheel in front is operated by a shaft leading to a small foot wheel within convenient reach of the operator. The downward motion of rocking, through the segmental gear wheel and connected parts, operates the fly wheel, which motion is thence transmitted through the internal gear wheel to the main driving wheel. With the upward motion, the segmental gear wheel is carried to its former position by a coil spring, that had been compressed by the downward movement, but this upward motion of the segmental gear wheel does not affect the motion of the fly wheel, as the pawl and ratchet connection is such as to transmit motion only in one direction. If the operator desires, he can, by pressing on the foot piece, assist the segmental gear in its downward movement, thereby increasing the power transmitted to the main driving wheel. A pawl is arranged to prevent the fly wheel from running in a wrong direction, and a brake is provided with a handle within convenient reach. A modified construction is provided for in a velocipede for carrying freight, in order to give increased power applied at a slow rate of speed. For further particulars address Mr. P. A. Frie, Curacao, Dutch West Indies.

AN IMPROVED MUSIC CHART.

A simple and efficient device for use in connection with pianos and organs, for transposing music from one key to another, is illustrated herewith, and has been patented by Mr. Charles S. Mason, of Earlham, Los Angeles County, Cal. A card, which forms the body of the chart, is provided with three rows of letters, representing in three series the notes of the scale, as shown in section in the small figure. The letters represent the notes of the natural scale and sharps larger than the flats, while the flats are printed in red, so that when they are superposed upon black they may be readily distinguished. The card has projections upon its bottom edge adapted to fit into the wider spaces between the black keys of the keyboard to locate the chart with reference to the scale of the instrument, and is provided with appropriate indices and numerals representing the signatures. An apertured card, with three stripes of different colors, is arranged to slide over the other one, the apertures being in the order required for showing the letters of the different chords of the various keys, with an aperture also for exposing to view the figures on the rear card representing the signatures, the top line or color stripe representing the tonic or first chord, the second line the sub-dominant chord, and the third line the dominant chord. The chart cannot be wrongly placed upon the instrument, and the rapidity and simplicity with which changes can be made from one key to another are obvious at a glance.

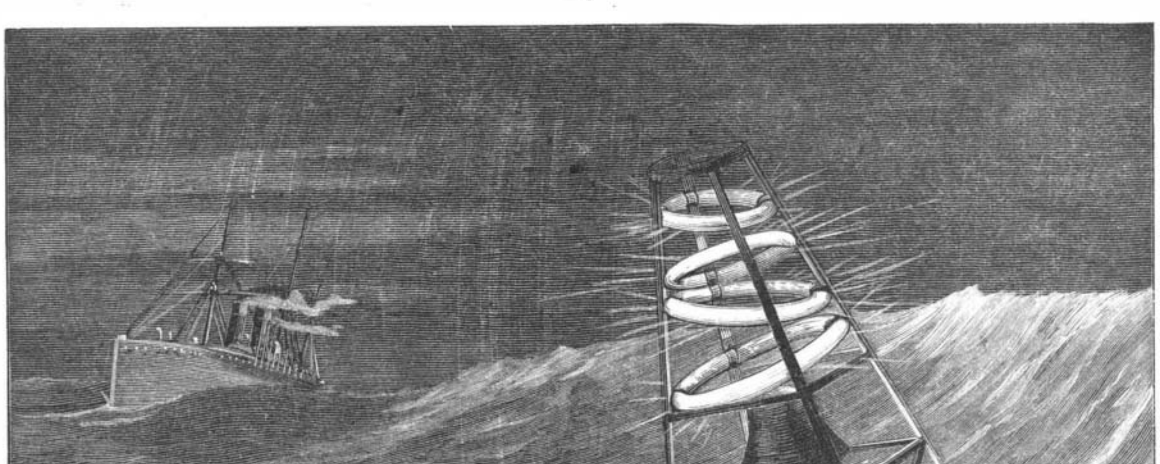


MASON'S MUSIC CHART.

SELF-LUMINOUS BUOY.

BY GEO. M. HOPKINS.

Among the tried devices for rendering buoys luminous are lamps arranged to burn for a long time, phosphorescent mixtures, electric illuminators supplied with the current from the shore by means of a cable, and the more recent luminous paint, which absorbs light by day and gives it out at night. Compressed gas has been employed with great success, some of the buoys having been designed to carry six months' supply of gas and to serve as light ships.



SELF-LUMINOUS BUOY.

The engraving illustrates illuminating apparatus designed as an auxiliary to bell buoys and whistling buoys. It is based upon the generation of electricity by the agitation of mercury in a high vacuum or in gas of high tension. The self-exciting Geissler tube involves the same principle. The buoy represented in the cut is adapted to ring a bell by the rolling motion imparted to it by the waves. Advantage is taken of this motion to agitate mercury in the annular tubes placed in the upper portion of the frame of the buoy. The tubes are made very heavy and strong, and each contains barriers for causing friction of the mercury against the sides of the tubes.

To insure the action of one or more of the tubes at all times, they are inclined at different angles. A slight motion of the buoy causes the mercury to travel circularly in the tubes and generate sufficient electricity to render the tubes luminous.

How to Concentrate the Power of Small Streams.

At the Niagara mill of Bainton Bros., at Buchanan, Michigan, the stream does not furnish water at all times for their 35 horse power wheel, but the Firmus rope transmission enables them to utilize the water again by a second dam 1,100 feet down stream from the first, where a 25 H. P. wheel has been placed. A pulley is placed on the shaft of the last named wheel, and from this the rope travels first to a pair of mule pulleys on the first tower, set on rising ground just above the bank of the pond. From these mules the rope passes in a straight line to the main transmission pulley on a countershaft at the mill, and intermediately supported on six sets of bearers. This countershaft is belted to the main line shaft and is provided with a clutch, so that the transmission may be connected or disconnected at will.

This example shows that it is easy to use the water over and over, and that the lay of the ground is of small importance. It is advantageous, of course, to carry the transmission rope in a direct line, or at least all in one vertical plane, but deviations of direction are not of large importance. In the case illustrated, the rope was carried away laterally to the mules, in order to avoid setting one or more of the bearer towers in the lower pond, where they might be difficult of access in winter. The resistance encountered is that due to the weight of the rope on the bearer journals and the aerial friction on the rope. These are quantities so small that a man can, with one hand, move this transmission from a state of rest, when disconnected from the line shaft. A change of direction increases the journal pressure of the mules, but the rope may go over hills or down into valleys without other effect than increasing its length. Practically, however, as shown in the illustration, inequality of the ground may generally be neutralized by putting the several bearers on the same level or nearly so.

The figures of this transmission are as follows:

Power to be transmitted 25 H. P., distance 1,100 feet, velocity of rope 3,125, transmitting 25 H. P. would show the tension to be $\frac{33000 \times 25}{3125} = 264 \times 60$ lb. (one half the tension weight), equals 324 lb. total strain on rope, but there being two wraps, hence the strain will be divided by two, thus: $\frac{324}{2} = 142$ lb., which is about 5 per cent of the breaking strain of a half inch Firmus rope. The breaking strain of Firmus rope is about 25 per cent greater than Manila.—*Power and Transmission.*

THE British Admiralty is about to build two war ships like the Spanish armorclad cruiser Reina Regente, which has attained such remarkable speed—22 knots per hour. With such examples of enterprise and improvement before it, what a spectacle of stupidity is presented by our navy department in contracting for new ships capable only of 19 knots!