REDIER'S BAROGRAPH

We give on page 161 an engraving of an instrument invented by M. Louis Redier, one of the Vice-Secretaries of the *Société Météorologique*, and constructed under his superintendence at the factories of Messrs Redier and Co, Paris, and exhibited at the rooms of the *Société Météorologique, France*, and at the last meeting of the Meteorological Society, England.

This simple and easily-managed instrument is well worthy of the closest inspection, and the engraving shows it to so great an advantage that, with the description we are able to give, from having seen it actually at work, and also from having inspected the curves of pressure produced by it, we do not despair of rendering the engraving and description perfectly intelligible to our readers.

The apparatus consists, in the first instance, of an ordinary siphon barometer tube B B, mounted on the slab C C, on which are two binding screws X, working in slots for allowing a vertical motion to be given to the slab carrying the barometer. This motion, by the action of an escapement at E driven by the train at M, which is always in operation, tends to draw the recording pencil K towards itself, and also to raise the slab C C, with its attached barometer B B. The upward movement of the slab C C is effected by the escapement at E through the medium of the pulley P the axis of which is worked by the toothed wheel Y of a differential train, not shown in the engraving. The connection between the recording pencil K and the pulley P is maintained by a chain which is always kept tight by the counterpoise Q.

Upon the surface of the mercury in the open leg of the siphon rests a very light ivory, F, which carries a very light vertical needle, on the top of which rests a very long but *extremely* light arm A, having a ratchet at its end, which, when in position, confines the fly V driven by the train at N. The float, needle, and arm together weigh but a few grains. As soon as the slab C C is raised sufficiently high by the train at M to release the fly V, the speed of which is twice that of E, the upward motion of the slab is arrested. It then descends until the motion of the fly is stopped by the ratchet of the arm A catching it. While this state of things continues—viz, the alternate upward and downward movements only—the pencil describes upon the recording paper I I a straight line. It will thus be seen that the actual work of recording is borne by the trains M and N, and that the barometer itself has nothing whatever to do in overcoming the friction of the pencil, which, so long as there is no change of pressure, retains its normal position as regards the paper. A careful inspection of the engraving will, however, show that another agency may come into play in releasing the fly V. A decrease of pressure raising the mercury in the siphon end of the tube will release the very light arm A, and release the fly; there will consequently be an additional action of the train N other than that of raising the slab C C, tending to displace the normal position of the pencil as regards the paper, and to show upon it the diminished pressure. On the other hand, an increase of pressure will lower the mercury in the open end, and this, in its turn, will shift the pencil as regards the paper in the opposite direction. By means of the barometric movement thus acting on the very light portion of the apparatus for shifting the positions of the pencil, the curves of pressure are described with perfect accuracy. In addition to the clock movements for driving the escapement E and the fly V, there are two others—R for driving the cylinder carrying the recording paper I I, and R1 for actuating at intervals the tapper O, for the purpose of overcoming any capillarity in the barometer.—*English Mechanic.*

LOUISBURG RAILWAY.

About midway between Louisburg and Cape Breton Collieries, the Mira River, or Canyon (a wide fissure through which the tide flows into a chain of lakes some 25 miles inland) crosses the line of railway, now nearly completed by the contractor, F. N. Gisborne, Esq., C.E., of London and Sydney, Cape Breton.

A light, elegant, though exceedingly strong lattice girder iron bridge now spans this river and on the 14th of January, a 36 ton Fairlee Locomotive with trucks, crossed it without producing any visible deflection or movement in the structure.

This being the most important bridge in Cape Breton, and probably the only example in the Province of an iron structure supported upon wrought iron cylindrical screw piles, the following particulars may prove of interest.

Length of bridge over all 336 ft; length of spans (4) each 72 ft; length of draw bridge or lift 30 ft.; length of wrought iron screw piles 70 ft, diameter of do, (shore piers) 2 in. each, 3 ft; diameter of do. (centre piers) 6 in. each, 2 ft. 4 in; depth of water with 7 knot current 22 ft.; depth of sand and gravel to rock bottom 10 ft.; height of lattice girders above water 48 ft.

The shore abutments spring from the sides of the ravine 21 ft. below rail level and are substantial structures of cut free stone.

The first pile was screwed down on the 20th of August last, and upon the 22nd of December, a period of four months only, the bridge was finished at a total outlay of $42,000.

The designers and manufacturers, (with whom Mr. Gisborne agreed for the structure under his contract with the Cape Breton Company,) are "The Hamiltons' Windsor Iron Works Company" of Birkenhead and London, and its erection was intrusted to their engineer, Mr George Earle, the Cape Breton Company being represented by A. H. LeBreton, president engineer.

Only last May was the first sod of the Louisburg railway turned and within a year 21 miles of one of the most varied and difficult lines in the Dominion will be nearly completed, including the crossing of Catalone Lake 1600 ft long with 15 ft. and 15 and 20 ft. of soft mud, — swamps which have to be piled 42 ft. deep, to support superstructures 25 ft. high and the great coal shipping pier at Louisburg, 600 ft. in length, 28 feet above tide water and with 34 feet water alongside.

Mr Gisborne and his able assistant engineers Messrs. A J Hill and T J. Ritchie may be congratulated upon the large amount of such varied work being accomplished within so limited a period.

NEW IRON BRIDGE OVER THE DESJARDINS CANAL.

This bridge was erected last fall to replace a bridge of the same material constructed in the United States which fell into the canal, last summer, carrying down with it in its fall two waggons, teams and drivers. The horses were drowned but the drivers escaped without fatal injuries. This is the sixth bridge that has been erected over this chasm. The first, an iron suspension bridge was blown down by the wind. The next a tressel wooden bridge was taken down having decayed and become dangerous. Afterwards the iron bridge previously referred to and the one shown in the sketch. The two first spanned the canal at the top of the heights, the two latter at a lower elevation. There have also been two drawbridges here for the G. W. R'y, one a wooden one destroyed by the memorable accident of 1857, and the present one shown in the sketch having been erected after the accident. This bridge (subject of sketch) was built in Hamilton, the work being done by J. H. Killey & Co., and Burrows Stewart and Milne, Engineers and Iron Founders. It is what is called a whipple, arch truss. The arch is 124 feet to centre of tressel work columns, which columns stand 60 feet above the level of the water and are placed on strong masonry abutments; the girders forming the approaches to the centre are 40 feet long each and rest on masonry foundations, the total span being about 200 feet. The weight of the bridge including cast and wrought iron is about 80,000 lbs. all the iron in its construction being tested by the builders to three times the strain ever likely to come on it. The cost of the bridge and its approaches which was defrayed by the G. W. R'y was $17,000.

The designer and engineer in charge of construction was J. K. Griffin, of Watertown. The view is from the west.

Simple Test for Lubricating Oils.—A simple method of testing for hydrocarbons or mineral oils in lubricators is to fill a bottle with the oil in question, moistening the cork and inside of the neck of the bottle, and then twisting the cork about its longer axis. The best lubricating oils produce no sound, but the more the oil is adulterated with hydrocarbons and products of dry distillation, the louder the noise produced. An oil that gives a loud cry is most unfitted for a lubricator.