Motive Power Resources of Maine.

A glance at the map of Maine reveals what seems at first sight a small inhabited streak of land bordering a much indented seacoast, and resting on this streak of land a huge wilderness covered with forests and lakes. This first impression is not altogether an incorrect one, for although the State has an area of 33,040 square miles, or only 385 square miles less than the total area of all the other New England States combined, it has a population distributed almost entirely along the seacoast, according to the census of 1890, of only 661,086, or less than the combined population of Boston, Worcester, Lowell, and Lynn.

It is not what Maine is but what Maine is to be that attracts the attention of the person who examines its wonderful surface and its untold and almost untouched wealth. The annual rainfall upon the area of this State, assumed at 42 inches, if accumulated to the depth of Lake Erie, would cover 871 square miles. In cubic feet the total measure of this immense amount of water is about 3,073,000,000,000. Allowing that only 40 per cent of this rainfall is removed by drainage, there yet remains nearly 1¼ trillion cubic feet of water to be carried by the numerous rivers of the State into the ocean. Assuming the mean height of the State to be 600 feet, it is easy to calculate in general terms the power that is generated by this water before it reaches the sea. Thus allowing that the water carried away by the rivers is annually about 1,229,200,000,000 cubic feet, it is plain that this amount of water falls through the mean distance of 600 feet. At each foot of fall, it is estimated 4,429 horse power are generated, which, multiplied by 600, gives 2,656,200 horse power, which it is not unfair to represent by the working energy of over 34,000,000 able-bodied men (or nearly twice as many as there are at present in the United States) laboring throughout the year without intermission for food or sleep.

This almost inconceivable power is distributed throughout the State in lakes and rivers. The importance of the lake system of Maine is appreciated by no one who has not studied it. There are only three or four districts of the same size upon the globe that can at all compare with Maine in the extent of its lake surface. The Kennebec River has more lakes connected with it than the gigantic Orinoco, and the Penobscot than the Amazon. Without counting the smallest variety, thereare in Maine between 1,500 and 1,600 lakes, having a total area of between 2,000 and 3,000 square miles.

Looked at in their relation to power, the lakes have an especial value. They are all, with scarcely an exception, connected with the various river systems of the State, and are, moreover, in the majority of cases at such high elevations that their positions make them storehouses of potential energy, which needs but to be properly tapped to set the wheels of industry in motion even hundreds of miles away. Eight of the large lakes have their surfaces over 1,000 feet above the level of the sea, while the waters of Rangeley are over 1,500 above the ocean, or but a few feet below the level of Lake Itaska, the source of the Mississippi. Connected as they are with the rivers, they act, moreover, as reservoirs for the gathering of the drainage, which can be sent down through the rivers in much more uniform quantities than would be possible were they not present to serve as checks.

It is impossible here to go into details concerning the rivers of Maine and the unrivaled opportunities they present to manufacturers who wish to put up small or large establishments. The rivers are there and are yearly carrying unused into the sea millions upon millions of horse power, fully 75 per cent. if not more, of their energy going at present utterly to waste. The time has arrived for the harnessing of these streams, and the investor or manufacturer who hastens to build beside them the factory or the electric generating station, with its miles of copper wire for power transmission to distant cities, is assured of a return for his capital, his trouble, and his good judgment which he could not so surely obtain in any other way.

There is much which we have not the space to add, but perhaps enough has already been said to awaken the interest of the reader to such an extent that he will investigate the subject for himself; and it is not entirely impossible that at some future time we may return to a subject which is so fascinating, and concerning which it is impossible to say the last word. —*Manufacturers' Gazette.*

Steam Power from House Dust.

The Refuse Disposal Company, London, have lately published a pamphlet on the question as to the practical means by which the dust refuse of towns can be utilized for electric lighting purposes. The company claim that 20,000 tons of house dust, if treated as they suggest, and burnt in suitable boilers, might be made to produce as much as 5,600,000 indicated horse power hours, equal to an engine of 1,183 indicated horse power working for 4,734 hours, for electric lighting.

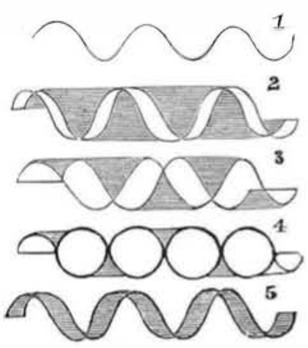
EXPERIMENT IN PERSISTENCE OF VISION.

T. O'CONOR SLOANE, PH.D.

A method of illustrating persistence of vision with the production of very pretty and varied effects is shown in the accompanying illustrations. Briefly stated, it consists in rapidly vibrating different designs. By persistence of vision these designs produce varied effects which change with the amplitude of vibration. While for producing such vibration simple agitation by hand may be measurably successful, a special vibrator is shown in the cut, which is very simply constructed, and which far exceeds in its results the hand of the operator.

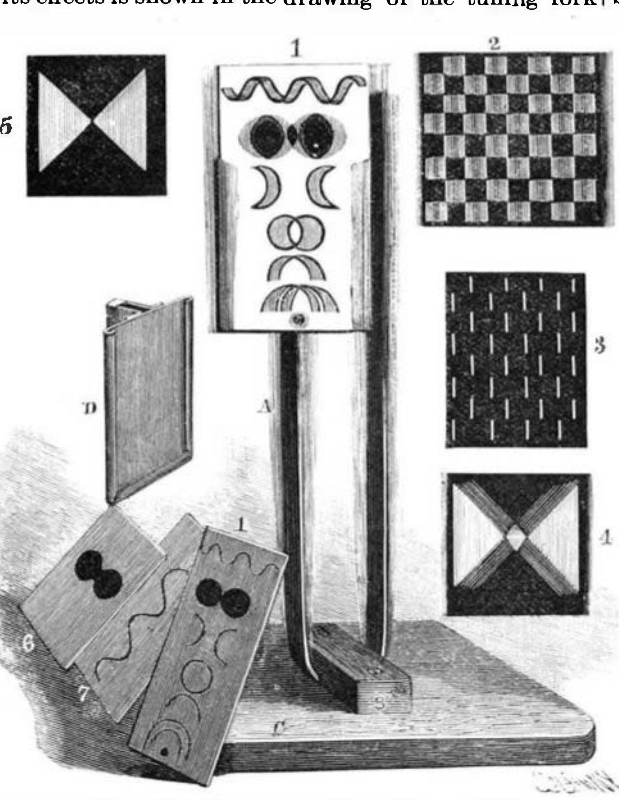
To make the vibrator a long flat bar of brass is bent into U shape. The bar may be 30 inches long, half an inch wide and one-eighth inch thick. This makes a sort of tuning fork, as shown in the cut at A. The block of wood, B, slotted to receive the bend of the tuning fork, is screwed on the base, C, securing the fork thereto.

The fork thus mounted will have an amplitude of vibration of half an inch or more. The designs to be vibrated may be drawn upon paper and may have paper loops pasted on their backs to receive the end of the tuning fork, so as to be thereby secured to it. It is, however, more convenient to make a frame such as is shown at D, of very thin metal or else of paper. At the back is a long band or loop to receive the tuning fork just described. This loop is partly or entirely closed at its upper end to prevent it from dropping down toward the bend of the brass bar. When in place different designs can be inserted into it in front, the inwardly turning portions or flanges holding the design in it.



Various examples of designs are given. Fig. 3 is a blackened piece of paper with short white lines drawn and distributed as shown. When vibrated this seems to widen out, the white lines become squares, and when the proper amplitude of vibration is reached an almost perfect checker board, Fig. 2, results.

Fig. 5 shows another design, which speaks for itself. When vibrated, a very peculiar effect is produced, one of the phases of which is shown in Fig. 4. A variety of designs can be placed on the same piece of paper. Fig. 1 shows such a piece of paper, and one of its effects is shown in the drawing of the tuning fork itself. Crescents, intersecting circles and other peculiar effects are produced from the designs shown in Fig. 1. The most interesting of the figures is the sinuous line with horizontal axis shown at the top of Fig. 1. As the fork's amplitude of vibration continually decreases, each design, as vibrated, produces successively a number of effects, and in none is this better shown than in the horizontal sinuous line.



EXPERIMENT IN PERSISTENCE OF VISION.

In the small cuts the changes such a line undergoes are illustrated. Number 1 shows the line; number 2 the appearance produced with a considerable amplitude of vibration. As the beat of the fork diminishes, number 3 and then number 4 appear. In the latter for an instant almost a perfect series of circles results. This is but for an instant, as, while one watches them, the circles merge into a ribbon as shown in number 5, which grows narrower and narrower as the swing diminishes in extent. In Figs. 6 and 7 other designs are shown. In Fig. 7 will be recognized the sinuous line designed to be vibrated when in a vertical position. A very pretty effect produced by a semicircle with horizontal axis is specially worthy of being noticed. Every design gives not only new effects varying with the amplitude of vibration, but different positions of the same design produce quite different results.

The Action of Alkalies on Glass.

BY F. FOERSTER.

The following facts concerning the action of solutions of alkalies and acids upon glass have been collected from the results obtained by the author and others who have experimented in this direction.

1. Solutions of caustic alkalies act upon glass much more strongly than water, since, except in very dilute solution, they dissolve all the constituents of the glass as such.

2. Of the caustic alkalies, the most active is caustic soda, then follows caustic potash, and then ammonia and baryta water.

3. Rise of temperature increases the action of the alkalies very considerably.

4. The action of the alkaline solution increases with the concentration, at first rapidly, but afterward only very slowly.

5. Highly concentrated solutions at the ordinary temperature have less action than more dilute ones.

6. Pure alkaline solutions, not too highly concentrated, have less action upon glasses than such as have been rendered impure by small amounts of silicic acid.

7. Alkaline carbonates, even in very dilute solutions, attack glass much more strongly than water. Their mode of action corresponds rather with that of other salts than with that of the caustic alkalies. In equivalent concentration, solutions of sodium act more powerfully than those of potassium carbonate.

8. The action of salt solutions upon glass is made up in a manner which varies with the concentration and the kind of salt, of the action of the water itself, and that of the salt which is present.

9. Both these modes of attack are differently influenced by the composition of the glass.

10. These salts act more strongly than water whose acids form insoluble lime salts. The action of these increases with concentration.—*Chem. Tr. Jour.*

Elastic Foundations for Engines.

The desirability of mounting gas engines and other motors used in town industries upon spring foundations having been mooted in *Industries*, Mr. Robert H. Smith, of the Mason College, Birmingham, writes to that paper expressing his views on the subject. He remarks that all foundations are in some degree "springy," and that the really practical question is as to the amount of springiness to give to the foundation under stated conditions of working of the machine, and under what conditions it is desirable to make this springiness as nearly zero as we can get it. He goes on to narrate how a gas engine in Birmingham was lately causing much annoyance by the vibration and noise it created in the building in which it was placed. An attempt was accordingly made to remedy the evil by mounting the wooden sole plate that carried the engine and the dynamo driven by it upon a dozen rubber pillarets, 3 inches diameter and 4 or 5 inches high. The result was a failure; the oscillations of the engine bed plate being excessively violent and irregular. Mr. Smith proceeds to discuss the nature and operation of the stresses tending to produce oscillations in a combined arrangement of gas engine and dynamo; and he concludes that any solution of the difficulty must be of the nature of a compromise between the giving of annoyance by vibration and damaging the machinery by shaking. He recommends, in case a spring cushion and a massive brick, stone, or concrete foundation can be used in combination, the putting of the former underneath the latter, to the top of which the engine bed plate should be bolted as hard and fast as possible. Of course, such a situation for the spring cushion would be a permanent one; and therefore rubber would not be a suitable material of which to make it, because its elasticity is soon lost under severe stress. If they could be secured from rotting, it might be supposed that a pitful of brushwood fascines would be the ideal spring cushion to put underneath a masonry engine foundation. Perhaps alternate layers of tarred felting and corrugated steel sheets would act well. A thick layer of felt is probably the cheapest.

A TRAVELER in the Maine backwoods this season was somewhat surprised on coming upon a lumberman's camp, full thirty miles from any settlement, to hear the music of an organ and the strains of an operatic air. He was met on entering the camp by the organist, a bright, neat Maine girl, who he found was also the cook, who had taken along her parlor organ out to camp to entertain her father and his crew in the long evenings during their stay in the wilderness.