## IMPROVED TURBINE WHEEL GOVERNOR.

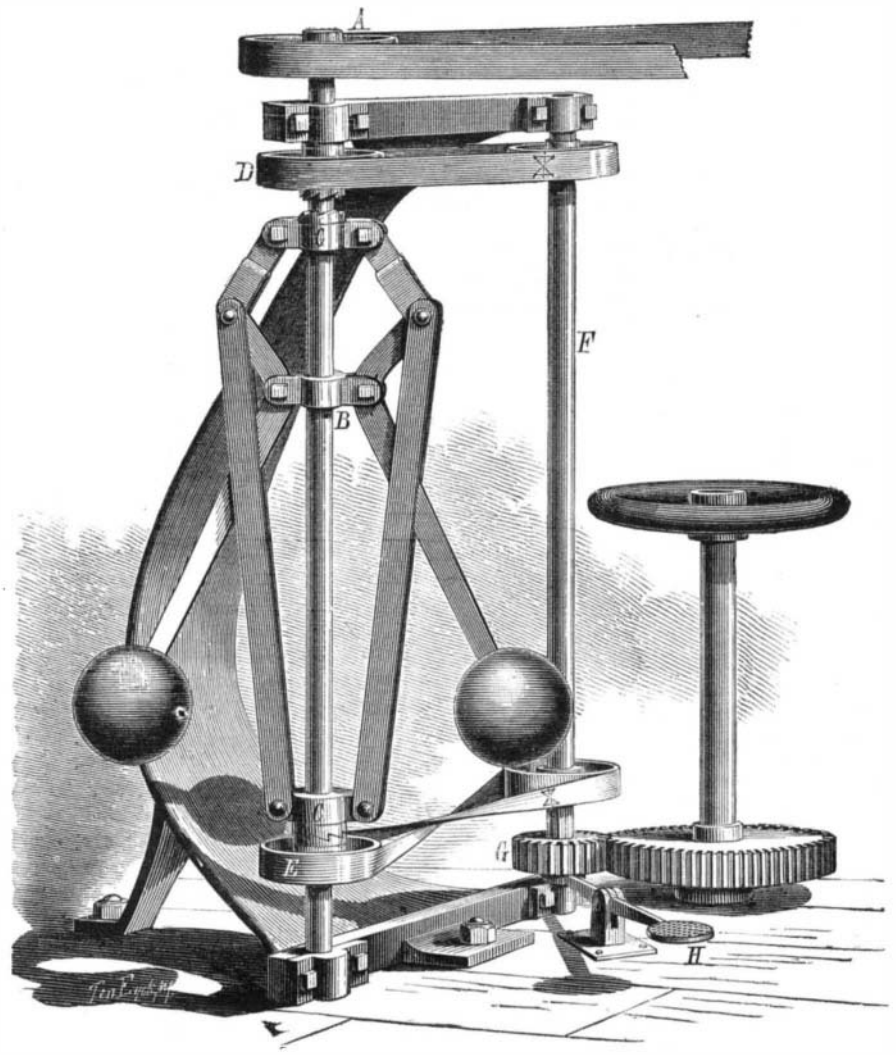
We illustrate herewith a novel and simple form of apparatus, which, it is claimed, acts as an efficient and reliable governor for turbine or other water wheels. The construction is of a type generally familiar, the balls being thrown out by the centrifugal force of the rapid rotation, which of course increases with the speed, thus, through suitable apparatus, controlling the gate, and hence the quantity of water which reaches the buckets of the wheel.

A is the driving band and pulley by which motion is given to the governor shaft. Pivoted to lugs immovably secured to the latter, at B, are the bent levers, which terminate in the balls as shown. These communicate with other pivoted rods, the connection between which is clearly indicated in the engraving, and which finally connect above and below with sleeves, C, which slide freely up and down the governor shaft. To the sleeves are secured portions of clutches, the corresponding parts of the latter being attached to two loose pulleys, D and E. Pulley D connects with another pulley on a second shaft, F, by means of a straight belt. Pulley E, however, is attached to the same by a crossed band. Consequently the effect is that, when the pulley, D, is in action, the shaft, F, rotates in the contrary direction to that which it assumes when the pulley, E, is in operation. Shaft F has a pinion, G, on its lower end, which pinion communicates with a gear wheel on the gate shaft.

The operation of the device can now be easily followed. The turbine is started by opening the gate by turning the large hand wheel shown on the shaft. To do this the pinion, G, which is connected with the shaft, F, by a slot and feather, is lifted by the foot lever, H, so that its teeth no longer engage with those of the gear wheel. As soon as the turbine is in motion, however, the pinion is allowed to fall back into place. The pulley, A, rotating the governor shaft, transmits motion to the balls through the rigid connection of their arms at the point, B. It is evident that, as the rapidity of motion increases, the balls will assume a position more nearly perpendicular to the vertical shaft, and in so doing will raise the upper sleeve so that the clutch upon it and the pulley, D, engage, causing the pulley to be carried around. By this means the shaft, F, and pinion, G, will be rotated so as to turn the gate shaft and partially close the gate, thus checking the inflow of water.

The speed of the wheel will, of course, diminish, when the balls will fall and the clutch above drop out of action. In case the speed should become too slow, then the further effort of the balls to reach the lowest possible point will cause the lower clutch to come into action with the pulley, E. This, however, as we have already explained, causes the shaft, F, to turn in the opposite direction, opening the gate wider and increasing the speed. It is evident that the supply of power will be so adjusted as to develope a speed of shaft that will keep the governor arms and balls between the two clutches, for, as a matter of course, the moment either clutch comes into action, the effect is either to increase or diminish the speed until the apparatus resumes its proper position.

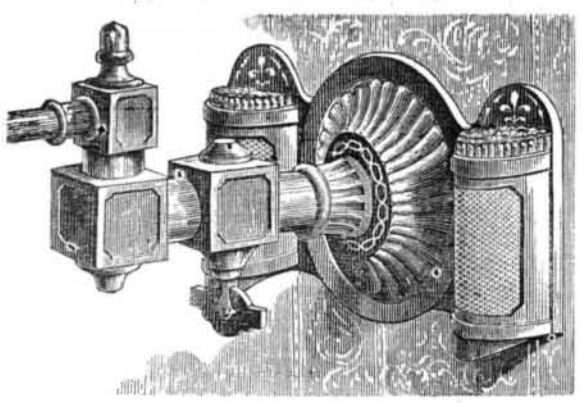
For further particulars address the inventor, Mr. Joseph F. Terhune, Stockholm, N. J.




TERHUNE'S TURBINE WHEEL GOVERNOR.

## GAS BRACKET MATCH SAFE.

Everybody has experienced the annoyance of searching for matches in a dark room, doubtless to the no small detriment of temper as well as of such projecting portions of the body as are brought in sudden contact with vagrant rockers or sharp corners of tables and bureaus. Match safes, in fact, have the unpleasant peculiarity of apparently never remaining in the spot where last placed, because every one using the contents leaves the box wherever about the room he may happen to be, so that the next person is obliged to hunt for it. Moreover, about nine tenths of the common match receptacles upset on the slightest provocation, strewing the floor with inflammable material, ready to take fire and burn holes in the carpet, and sometimes set dresses on fire, whenever accidentally stepped upon. We illustrate herewith a new form of safe, the invention of Mr. M. L. Orum, which can neither upset nor wander about a room, because it is fastened immovably to the wall by screwing the gas bracket against it. The fixture is first removed, the hole in the device slipped over the pipe, and the bracket replaced, the whole being the work of a moment. Thus located, the box is always at hand when and where wanted, and, besides, is situated at the point where matches are usually scraped upon the wall, thus preventing injury to the paper or paint. It can be made with either one or two receptacles for matches, two being preferable, as one of the boxes may be employed to receive the burnt sticks. In material, style, and design, the attachment may correspond to the bracket to which it is screwed.



For hotels, where lodgers are apt to carry off the match boxes, the invention is excellently adapted, while its convenient and ornamental form will doubtless commend it as a necessary appendage to the gas fixture in every room.

For further particulars regarding rights to manufacture, application should be made to Messrs. Mellor & Orum, 448 North 12th street, Philadelphia, Pa.

### The Opeloscope.

This is a new and simple instrument, suggested by Professor A. E. Dolbear, for the purpose of demonstrating the pulsations of sound. Take a tube of any material, from one to two inches in diameter, and anywhere from two inches to a foot or more in length. Over one end paste a piece of tissue paper or a thin piece of rubber or goldbeater's skin; either will do. In the center of the membrane, with a drop of mucilage, fasten a bit of looking glass not more than an eighth of an inch square, with the reflecting side outward, of course. When dry, take it to the sunshine, and, with the open end of the tube at the mouth, hold the other end so that the beam of reflected light will fall upon the white wall or a sheet of paper held in the hand. Now speak, or sing, or toot in it. The regular movement of the beam of light with the persistence of vision presents very beautiful and regular patterns, that differ for each different pitch and intensity, but are quite uniform for given conditions. If a tune like "Auld Lang Syne" is tooted slowly in it, care being taken to give the sounds the same intensity, a series of curves will appear, one for each sound and alike for a given sound, whether reached by ascension or descension, so that it would be possible to indicate the tune by the curves; in other words, it is a true phonautograph.

By trial one can find some tone which causes the membrane to vibrate in a single plane, and of course a straight line will appear upon the screen. If, while the sound is continued, the tube be swung back and forth at right angles to the line, the sinuous line will appear, which may be either simple, representing a pure and simple sound, or it may be compound sinuous, showing over tones, precisely as in König's manometric flames.

With the lecture room darkened and using the beam of light from a *porte lumière* or from a lantern, these may be projected of an immense size. There is no trouble in the world in making them eight or ten feet amplitude or more if needed. At a distance of but three or four feet, the curves will spread out to two or three feet in length when a tone is made to which the tube can reasonably respond.

### The Water Supply of Rome.

In the course of a lecture on Roman antiquities, delivered at the Royal Institution, London, Mr. J. H. Parker said: The celebrated *Aqua Marcia* has recently been again brought into Rome, and is rapidly coming into use, being considered the finest drinking water in the world, always cool even in the hottest weather. On the river Anio itself, where a fine cascade falls over the rock, there is a deep rocky gorge; and here great engineering works were made in the time of Claudius and Nero. A great wall, 12 feet thick, built of large blocks of stone, was erected across the river at the lower part of the gorge, forming a dam of 100 feet high and 12 feet thick, to enclose a portion, perhaps 100 yards long, between the dam and the natural cascade; the water was made to fall over the dam, which thus became the cascade; but at one end of it a specus was made below the level of the surface of the water, so that the water must always flow through that specus, and consequently through Rome, before any of it could fall over the cascade. This magnificent and most useful piece of engineering continued in use for centuries. It was destroyed in the fourteenth century by an ignorant monk, who was annoyed by a temporary flood in the upper country, which overflowed the meadows near his monastery, and, to relieve that, he made a hole at the bottom of the great dam. The force of the water soon carried all before it, and caused a great flood over all the lower country, even to the Tiber, and did immense mischief—even the walls of Rome were injured.

Mr. Parker said that he had not time to describe the thermæ, or great public baths, to supply which most of the aqueducts were made, but he could not conclude without mentioning that the opinion, commonly entertained, that the ancient Romans were ignorant of the fact that water will rise to its level, is entirely a popular delusion. At every half mile of the aqueducts, on their course from the foot of the hills to Rome, each aqueduct forms an angle, to break the force of the water, and at that angle a great reservoir is made, with a piscina or filtering place at one end. Each piscina consists of four vaulted chambers, two above and two below. The water enters into the top of the first upper chamber; it then falls through a hole in the vault into the first lower chamber, then passes through small holes in the intermediate wall into the second lower chamber, then rises again through a hole in the vault into the second upper chamber, and then follows its course at the same level as it originally entered, depositing its mud in the lower chamber as it passed. Each piscina is therefore made upon the principle of water finding its level.

They used the large stone specus, or aqueducts, instead of ordinary pipes, because they could not depend either upon their leaden pipes or their *terra cotta* pipes to resist the force of such a stream of water. Nothing but the concrete stone was strong enough.

At the present time, the cast iron pipes of the new company are bursting every day in the streets of Rome to such an extent that the managers of the company fear that the expense will be ruinous to them. This seems to show that the old Romans were better engineers than we are.

### A Trade Mark Decision.

The value of trade mark security to manufacturers and merchants is forcibly demonstrated in the following recent decision of the Supreme Court, rendered in the Circuit Court of the United States for the Eastern district of Pennsylvania, McKenna, judge, in the case of the Lowell Manufacturing Company against Larned and Starr, which is of interest as bearing on the law of trade marks. The complainants many years ago began to send their rolls of carpet to market with a hollow wooden shell in the center of each roll. The annexed engraving exhibits the construction. Fig. 1 is a plan view of the inside half of the shell. Fig. 2 is an end view of carpet, rolled, with shell in place. This shell can both be seen and felt. Becoming a distinguishing mark of the goods, they continued its use and adopted it as their trade mark, registering it as such in January, 1871, under the act of July 8, 1870. Defendants copied it, and complainants having brought suit, pleaded that it was an unpatented mechanical contrivance for rolling the carpet and extracting the spindle. After full argument by Horace Barnard and Ludovic C. Cleeman for complainants, and Victor Guillon for defendants, Judge McKenna decided that the "shell" is a good and valid trade mark, and complainants are entitled to its exclusive use, further deciding that defendants have infringed. A perpetual injunction is granted, with reference to a master to compute and assess profits and damages.

Fig. 1.

Fig. 2.