A NEW WATER METER.

Mr. Charles Deacon, C. E., engineer to the borough of Liverpool, has recently brought into use a water meter which he applies to mains for the purpose of detecting waste. The invention, says *The Engineer*, to which we are indebted for the engraving, consists of a vertical tube lined with brass and equal in diameter at the upper end—where it is connected with the inlet from the main—to the diameter of that main, but larger at its lower end. In the tube is a horizontal disk of the same diameter as the main, with a vertical spindle on the center of its upper face, from the end of which the disk is hung by a fine wire passing out at the top of the tube through a brass gland. The wire is connected above with a counterbalance weight, which, when the water is at rest, retains the disk at the top of the tube, which it completely fills. If water is caused to flow through the instrument, the disk will find somewhere in the tube a position which it will retain until the velocity of the water changes. The lower end of the conical tube being about double the area of the main, no obstruction to the flow can take place, while the motion for any given increment of velocity near the top, or place of minimum flow, can be made equal to, or even greater than, that due to an increment at the bottom or point of maximum flow, so that its sensitiveness is not diminished at low velocities—a feature which is unattainable in any meters constructed on the turbine or analogous principles.

In order to insure the absence of any friction it was found desirable to abandon the use of a stuffing box, and to substitute a single brass gland, the hole in which fits the wire accurately, but not tightly. This wire, being an alloy of iridium and platinum, maintains its condition for any length of time, and the small quantity of water which oozes past it is allowed to drain away. The absolute accuracy and freedom with which the meter acts has been proved by the strictest tests. The vertical motions of the wire are registered by a pencil, connected with it, on a drum revolving once in twenty-four hours, the paper on which can easily be removed at any time and replaced by a sheet with horizontal lines, each of which corresponds with the hight at which the pencil stands when the number of gallons per hour marked upon the line is equal to the quantity passing through the meter. The essential peculiarity then of the waste water meter is that it registers on paper the exact quantity of water moving at every instant, and the exact time and rate at which that quantity changes. At twelve on the first fine night, a waste water inspector sounds each stopcock on the house supply pipes. If the inmates have retired, and a flow of water is heard, the stopcock is closed, its number and the time being accurately noted. At the same instant the meter registers the reduction in the flow of water, and the time at which it takes place. It is sometimes found desirable to arouse the inmates and enter the house, in order to obtain the necessary evidence of waste, especially when the running of water from taps is heard. In other cases the house is visited by the inspector early on the following morning; and if, while he is within, another inspector outside turns on the stopcock, there is generally no difficulty in detecting the source of waste at once. If, however, the waste is not superficial, sounding with the teeth at the taps and other fittings will generally discover a leak in the buried pipes. Each source of internal waste having been discovered by these means, the greatest care must be exercised by the inspectors to insure its remedy in the best possible manner.

A New Method of Determining the Sun's Distance.

The method consists in determining the parallax of one of the exterior planets when in opposition, not by micrometrical measurements of its distance from neighboring stars, but by noting the exact moment at which it may occult a given star and the duration of the occultation (provided such a phenomenon takes place). Theoretically, this is perhaps the most accurate of all methods, but there seems to exist, at first sight, an insuperable objection to its practicability; namely, the apparent impossibility of noting the exact instant of the disappearance and reappearance of the star. If we can get over this difficulty, nothing will stand in the way of a successful application of this method to determine the sun's distance. And here the spectroscope comes to our aid, and affords us the means of conquering this difficulty most completely.

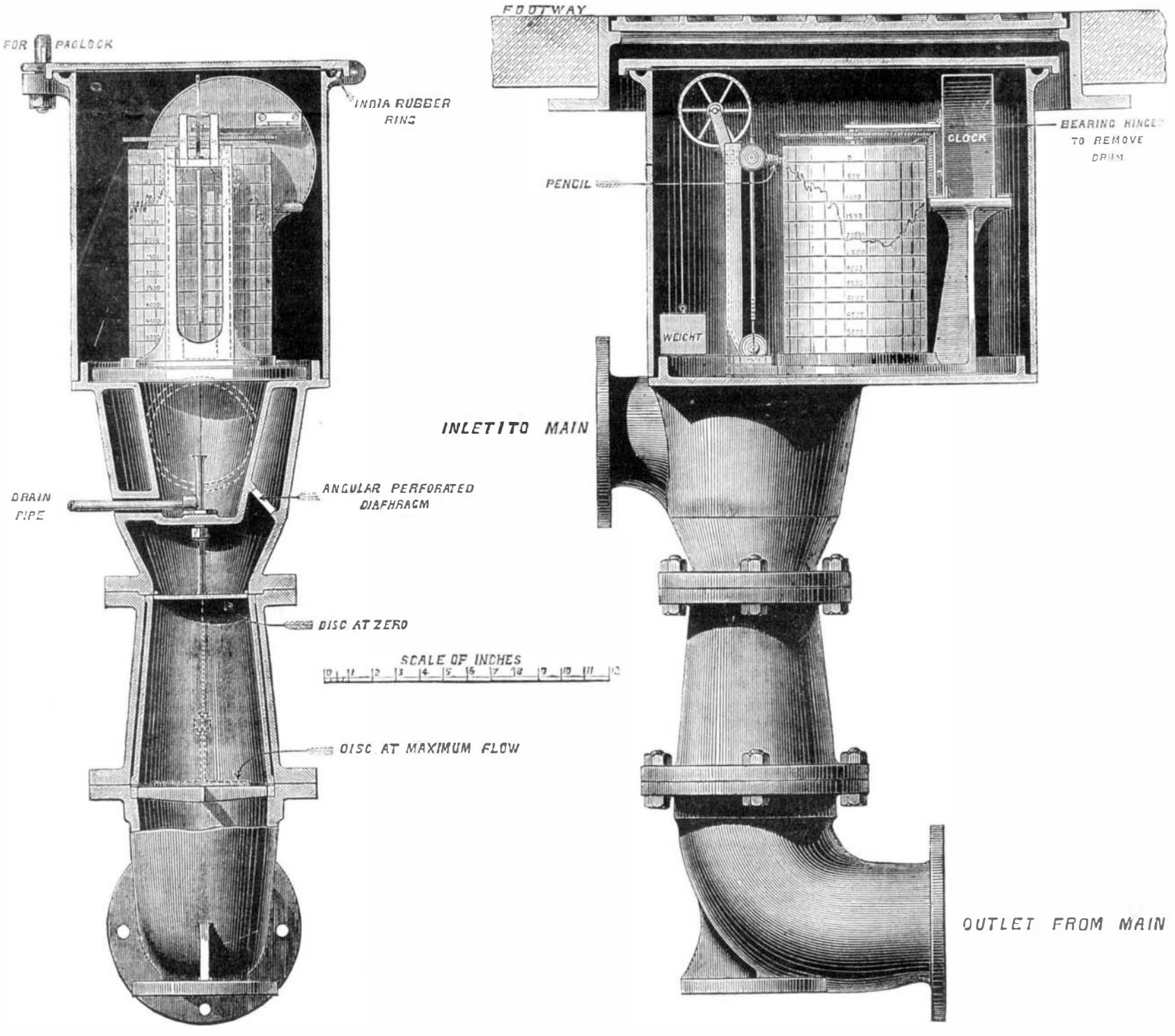
Suppose, just previous to the expected disappearance of the star behind the body of the planet, the spectrum of the two be brought into the field (the star being at that time of course very close to the edge of the planet's disk). We shall evidently have the spectrum of the star superposed on that of the planet, the characteristic stellar lines appearing as well as the planetary ones. This double spectrum will continue visible in the field of view so long as the star's light reaches the observer, but the instant its light is cut off by the advancing disk of the planet, at that instant will the stellar spectrum vanish. However slow the apparent motion of the planet, and however dubious the time of the star's disappearance, as determined by telescopic observation, it will be seen that the result obtainable by this method of observation must be most rigorously exact.

The only doubt as to the value appears to be the infrequency of the phenomenon. This, of course, depends entirely on the minimum brightness of the star compared to the planet, necessary to bring out its spectrum at the same time as that of the planet with the required distinctness. On the whole, Saturn would seem to be the planet most favorably situated for the occurrence of this phenomenon, as he has a considerable apparent diameter, while his being much less bright than Jupiter or Mars in opposition would allow of the use of much smaller stars than these two planets—his very slow motion also being a considerable advantage. By knowing previously, approximately, the portion of the planetary disk which will first occult the star, it would be easy to shut out a great portion of the light of the planet, and observe the spectrum only of that portion of the disk behind which the star would disappear. By an arrangement of this nature, I believe that stars down to the fifth, or even the sixth, magnitudes might be very well used for this purpose with either of the three above mentioned planets; and occultations of stars of these magnitudes cannot be very infrequent.—*George F. Hardy, in the English Mechanic.*

New Steam Auxiliary.

A new invention by Mr. J. Berger Spence, of London, consists in passing steam at ordinary atmospheric pressure into a solution of caustic soda, which is thereby raised to its own boiling point. It is proposed to use the heat thus developed to generate steam, the waste steam from an engine boiler being employed in the first instance to heat the caustic soda. Mr. Spence showed that the effect was absolutely produced by raising a solution of caustic soda to a heat considerably over 212° by means of a jet of steam, but he stated that he had not yet worked out practical details as to the employment of the idea, though he exhibited a sketch of an arrangement of boilers which he considered might render it available.

THE combustion of one pound of coal in one minute is productive of a force equal to the work of three hundred horses during the same time.



DEACON'S WASTE WATER METER.