

"On Browne's Patent Hydraulic Level." By A. F. Hemming.

New
Hydraulic
Level.

This instrument, designed for ascertaining the relative heights of points not visible from each other, consists of lengths of water-tight flexible tubing, attached to each other by brass joints, and having glass vessels at each end. The vessels and tubing being nearly filled with water, the level of the water, as seen in these vessels at two points whose relative heights are to be compared, will serve to indicate their positions, whatever may be the inflexions of the tubing betwixt the two vessels. Graduated rods are placed perpendicularly at the points of observation, and the lower vessel is raised, and the higher lowered, until the level of the fluid therein intersects the graduation of the rods. It is conceived that this level may be peculiarly useful in mines and excavations, and in fixing complicated machinery.

Light for
Light-
houses.

Captain Basil Hall briefly explained his views as to obtaining for lighthouses all the advantages of a fixed light by means of refracting lenses in revolution.

The difference between a fixed and a revolving light is much in favour of the revolving light, as the light can be concentrated and great brilliancy obtained on any particular point at each succeeding flash;—by a fixed light being meant one in which the light is visible on every side; and by a revolving light, one in which the light appears in periodical flashes. Fresnel's fixed light has only one-sixth the brilliancy of his revolving light. Fresnel's system consists in having a large central lamp with four concentric wicks, surrounded by eight lenses, each three feet diameter. The light is thus concentrated and thrown off in eight pencils, which, as they strike the eye successively, have very brilliant effect, and are visible at a great distance.

Captain Basil Hall's inquiries have been directed to ascertain whether the well-known superior brilliancy of a revolving light could not be obtained for a fixed or continuous light; that is, for one equally visible in all directions at the same moment. His idea was, that by giving a certain velocity of revolution to a series of lenses round a fixed light, as in Fresnel's arrangement, a continuity of illuminating power, equal almost in brilliancy to that of a slowly revolving light, might be produced. This, he expected, would prove true, provided no intensity were then lost. He had erected some apparatus at the Tower, and determined the effect by experiment. The apparatus consisted of a fixed central light with a

series of eight lenses, 1 foot diameter and 3 feet focal distance, so arranged as to revolve at any velocity up to 60 revolutions per minute. The light from the central lamp being concentrated by refraction through the eight lenses into eight pencils, having a divergence of about 8° each, illuminated not quite 50° of the horizon when at rest; but when this same system of lenses was put into rapid motion, every degree of the 360° of the horizon became illumined, and to spectators placed all round the horizon, the light would appear continuous and equally brilliant in every direction. The only question would be, whether or not this continuous light is essentially less intense than the light seen through the lenses at intervals when in slow motion. The fact is, that two distinct effects are produced in this experiment—a physical effect in diminishing the brilliancy of the light exactly in proportion to the ratio of the dark portion of the horizon compared to that of the enlightened portion, viz. as 310° to 50° ; and a physiological effect (suggested by Professor Wheatstone), by which the sensibility of the retina might be so excited by a succession of bright flashes, that not only a continuity of light might be produced, but a light not much, if at all, inferior in intensity to that caused by the lenses at rest. When first set in motion, the effect is that of a series of brilliant but trembling flashes; as the system of lenses is accelerated in velocity, the steadiness of the light increases with scarcely any apparent diminution of brilliancy. At 44 revolutions per minute absolute continuity is produced, and at 60 revolutions nearly the steadiness of a fixed light. When viewed from the distance of half a mile, the effect is nearly that of continuity, very much resembling that of a fixed star of the first magnitude. The only difference in the quality of the light is, that the lenses being in motion, it resembles a star twinkling violently; and when at rest, it resembles a planet. The difference of intensity had been measured by examining the light through a number of plates of stained glass. Some eyes had seen the light through 13 glasses, the lenses being at rest—and through 12, the lenses being in motion; other eyes with other glasses had seen it through 10, the lenses being at rest—and 8, the lenses being in motion. He had seen it through 9, the lenses being in motion, and through 10 at rest. He did not pretend to say whether mechanical difficulties might not prevent the adoption of the system; what he aimed at was to establish the principle, that by putting a system of lights into a rapid rotary motion, a continuous light visible in all directions would be the result, without any essential diminution of brilliancy, as compared to that of the same lights when viewed at rest. If this principle should prove correct,

its application to practice might afterwards be thought of, and left to the ingenuity of the engineer ; but if the principle should not be correct, and there was a great loss of light by the rotary motion, then it would be useless to go on.

Feb. 18, 1840.

The **PRESIDENT** in the Chair.

The following were balloted for and elected :—Henry Chapman, Alexander Macintosh, as Graduates ; Joseph Horn, Robert Sinclair, Captain P. W. Willis, B.E., Captain Chappell, R.N., as Associates.

Duty of
Engines.

Mr. Cottam, in reference to the discussion of a preceding evening (Feb. 4), on the duty of engines, alluded to the pumping engine at Hammersmith, which forces the water through five miles of pipes, and then through a vast number of smaller pipes, and was subject to great variations of service, and inquired how the duty could be ascertained with any tolerable accuracy, as the variable expenditure of steam under different circumstances must lead to considerable errors. If a boiler, as in the Cornish engines, is adapted to raise the bob 7 times per minute, and owing to some cause, as the water not being able to get away, the bob is raised only 5 times per minute, there is two-sevenths in favour of the boiler ; or if an engine adapted for 30 strokes per minute makes only 25 occasionally, there is great difficulty in comparing it with other engines.

Mr. Donkin urged the necessity of keeping the quality of the engine and its commercial effect perfectly distinct ; if a given weight be raised to a given height, it must produce a given effect minus the friction ; in water-works engines the resistance opposed by the friction is very considerable, and being very variable, it must not be allowed to interfere with the consideration of the intrinsic quality of the engine ; of two engines having equal power, one may discharge, owing to these circumstances, more water than the other, but if both be of the same construction and raise a given weight, whether the water be discharged perpendicularly or forced through any length of horizontal pipes, there can be no mistake as to the amount of the effect produced, or, in other words, of duty performed, as that would be determined by the weight raised if in a Cornish engine, or by the resistance overcome if in an ordinary pumping engine.