Correspondence.

Intermittent Vision.

To the Editor of the Scientific American :

The method of viewing animals in rapid motion, which is suggested by Mr. S. H. Brackett, is, doubtless, quite satisfactory, but it implies a greater amount of rapid motion on the part of the observer than is necessary. All that is wanted is intermittent vision; and this can be accomplished in a variety of ways. Instead of opening a shutter repeatedly by rapid motion of the fingers while looking through a tube, it will be found more convenient to look through an opening in a disk of cardboard, which is at the same time kept revolving. This may be controlled by clockwork (see Ritchie's "Catalogue of School Apparatus," No. 733); or, more cheaply, though less conveniently, as shown in Prof. A. M. Mayer's little book on "Sound," page 111—a book which every teacher of natural science in our country possesses, or is sure to possess as soon as possible after seeing it.

An advantage of this apparatus is, that the number of views per second which the observer secures is controllable, and the repetitions are quite regular. It is possible to dispense with tubes, so that the moving animal is more easily followed with the eyes. Moreover, by adjusting the disk in position so that the observer's interocular line is parallel to its plane and perpendicular to its radius, the opening passes so quickly before the two eyes in succession as to afford binocular rather than monocular vision.

The writer has employed this method quite satisfactorily in studying the forms of falling drops of liquid. He claims, of course, no originality in this, for the instrument has long been known under the name of the stroboscope.

W. LE CONTE STEVENS.

40 West 40th street, New York, August 16, 1882.

Drying Gelatine Plates.

J. J. S. Bird says, in a communication to the Bristol and West of England Amateur Photographic Association: An inconvenience which has caused no little trouble to workers with gelatine plates is the length of time they take to dry. A collodion plate can be held to the fire and dried in a very short time; but a gelatine plate under the same conditions would melt and run. Now, a gelatine plate may, under different conditions, be dried quite as rapidly as a collodion plate; and I have frequently taken a negative, dried it, and printed a proof in considerably less than half an hour.

The principle is simply to remove the superfluous moisture before holding the negative to the fire, and this can be done by applying a piece of perfectly clean blotting-paper to the surface of the gelatine, using at first a moderate pressure, and increasing this pressure to any degree required. The blotting-paper will in *no way* injure the negative, and any stray pieces of fluff will dust off when the plate is dry. Still, it is better to carefully dust the blotting-paper and to remove any stray pieces of material before it is applied. It will now be found that the negative can be dried at any degree of heat in the space of from thirty seconds to two minutes. This fact led the writer to the following:

If a gelatine negative be dried as above, at only a moderate heat, it will not perceptibly differ from a negative which has been allowed to dry spontaneously; but if a negative from which the superfluous moisture has been extracted by blotting paper be exposed to a greater heat the whole complexion of the negative is altered. Not only does the film become horny and tough, but the picture on it appears in *relief*—so much so that it seems to me quite possible to produce a cast from the negative capable of being printed from in an ordinary press. This is an extension of the principle referred to in this year's annuals, in which hot water is used as a *developer* ; but this does not seem either as simple or efficacious as the method I suggest above. At all events, I think the matter is worthy of the consideration of the Society, and I commend the hints to my fellow-members.—*Brit. Jour. of Phot.*

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The Electric Light as a Moth Catcher.

Dr. I. E. Nagle, of Vicksburg, Miss., suggests the use of uncovered electric lights for killing the moths, *Aletia*, from whose eggs the destructive cotton worm is hatched. He believes that a few lamps properly placed would attract and destroy the moths, so as to protect a wide belt of cotton country. The plan would be well worth trying wherever electric lamps are in use. In some parts of the South planters have found that brush fires or burning rubbish will attract the moths in swarms; and every female moth promptly killed prevents the birth of many worms. Whether electric lamps would prove more efficient or economical, only trial can determine.

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Bursting of a Ship by Swelling of Cargo.

The *Gazette Maritime et Commerciale*, in its news regarding ocean disasters, relates the following curious example of the formidable power of molecular forces. The Italian ship Francesca, loaded with rice, put into port on May 11, at East London, leaking considerably. A large force of men was at once put on board to pump out the water contained in the ship and to unload her; but, in spite of all the activity exerted, the bags of rice soaked in water gradually, and swelled up. Two days afterward, on May 13, the ship was violently burst asunder by this swelling of her cargo.—*La Nature.*

The Performance of American Locomotives.

At the recent American Master Mechanics' Association convention at Niagara Falls, the following interesting paper was presented by Dr. P. H. Dudley:

The practical performance of the American fast express locomotive of to-day far exceeds what was thought possible ten years since, and we know from experience that the improvements you are constantly making will increase its speed for heavy trains.

If the data in regard to fast ten and twelve car trains were all collected it would leave no doubt as to the ability to run them fifty miles per hour, on nearly level roads, or five and six cars at sixty miles.

Having drawn with my dynagraph car fast express trains upon various roads, I present a brief tabulation of part of a trip, showing the performance of an ordinary locomotive upon a train composed of three 8-wheel and six 12-wheel cars; weight, 250 tons; total weight of locomotive ready for the start, 126,000 pounds, distributed as follows: Tender, 54,000 pounds; engine, 72,000 pounds; 48.000 pounds being upon the drivers, which were six feet in diameter; cylinders, 17x24; steam-pressure gauge set at 135 pounds.

The first column shows the number of miles; the second, the time of run in minutes and seconds; the third, speed in miles per hour; the fourth, velocity of the wind in miles per hour; the fifth, approximate grades; the sixth, foot pounds of work, shown by the dynametrical curve, in drawing the cars per mile.

The seventh, foot pounds per minute expressed in horse-power.

The eighth, approximate calculated foot pounds of work required to move the locomotive itself, expressed in horse-power.

The ninth, the sum of columns seventh and eighth.

Column eight will vary with every locomotive, and could only be determined by direct experiment.

Number of miles.	Time in minutes and seconds per mile.	Speed in miles per hour.	Velocity of the wind in miles per hour.	Approximate grades.	Foot lb. of work shown by dynametrical curve per mile.	Foot lb. of work per minute expressed in horse-power.	Approximate calculated foot lb. of work required to move the locomotive in horse-p'r.	Sum of Columns 7 and 8.
1	2:54	20·68	......	Level	24,116,233	252	... ...	...
2	1:34	38·31	6	Down 5·3	20,035,253	369	221	590
3	1:22	43·90	4	Down 5·3	17,763,914	398	292	690
4	1:16	47·34	3	Level	15,904,273	383	418	791
5	1:11	50·70	4·5	Level	14,871,528	382	406	788
6	1:13	49·31	6	Up 13 feet	15,284,616	383	406	789
7	1:11	60·70	6	Down 18 feet	14,458,430	369	426	795
8	1:08	52·89	5	Down 13 feet	13,219,136	354	451	805
9	1:07	53·70	5	Down 8 feet	11,566,744	319	483	802
10	1:09	52·10	5	Down 5 feet	11,773,293	310	441	751
11	1:08	52·89	4·2	Level	11,773,293	316	447	763
12	1:09	52·10	5·2	Down 8 feet	12,806,038	337	456	793
13	1:10	51·43	6	Level	12,393,940	324	443	767
14	1:10	51·43	4·5	Level	12,8 6,058	339	426	765
15	1:10	51·43	4	Level	13,425,685	351	420	771
16	1:10	51·43	3·5	Level	13,293,136	345	415	760
17	1:08	52·89	3	Level	13,838,783	371	443	814
18	1:08	52.89	5	Down 6 feet	13,219,136	354	464	818
19	1:08	52·89	3	Down 2 feet	13,219,136	354	443	797
20	1:11	50·70	3·5	Up 10 feet	14,838,783	379	406	785
21	1:13	49·31	3	Up 10 feet	14,458,430	362	384	746
22	1:08	52·89	3 1	Level	12,393,940	332	443	775
23	1:07	53·70	3·1	Down 10 feet	12,186,391	333	462	797

In starting the train the locomotive would record a tension of 11,000 to 12,000 pounds for 150 or 200 feet of distance, then by hooking up the cut-off and other causes would reduce to 2,800 to 3,000 pounds when the speed of 50 miles per hour was attained in the fifth mile. As the speed increases the resistance of the air against the locomotive becomes greater, and more of its own power is required to move itself, and less can be used to draw the cars. The increased foot pounds of work in the first four miles show less than one-half of that required to overcome the inertia of the train for the speed of 50 miles per hour. Inertia is an important element of train resistance, especially on local trains, as it limits the speed for short runs and must be considered in choice of locomotive for the service. In starting a train the working adhesion of the steel tired drivers, on dry steel rail, is usually above 33 per cent. of the weight upon them, and reduces as the speed increases, but in what ratio, not ascertained by experiment; 18 to 20 per cent has been obtained at 56 miles per hour, the percentage of slip not exceeding 1½ per cent.

The great and substantial improvement in the permanent way, of late years, permits a higher percentage of adhesion than formerly.

One of the most important features shown in the tabulations is the quick steam-generating capacity of the boiler; 800, 900, or 1,000 horse-power developed in the brief time of one minute may be expressed in figures, but the mind fails to gain any adequate conception of the enormous power. At 135 pounds steam pressure, 300 or 338 pounds of water will be evaporated per minute with a consumption of 40 or 50 pounds of coal; this requires a very rapid generation of heat and its quick absorption by the water.

Owing to the large amount of heat which is absorbed by the water before it makes any pressure of steam, a less proportion of heat units is required to do the work at high pressures than low, therefore the rate of transmission per minute will be less for the heating surfaces.

The Swiss and German locomotives are reported to carry from 165 to 180 pounds pressure as a rule, with exceptional ones at 225.

In drawing fast and heavy trains on various roads, the greatest difficulty in making time has been want of steam. There are so many contingencies which may daily arise of winds, storms, etc., that provision must be made for a greater capacity than is required for ordinary occasions. In observing what the train resistance would be for the above-mentioned train, about 11 pounds per ton, it must not be concluded that this would also be true of any other weight of train; the resistance of the same number and class of cars increases in same ratio as the speed increases, and as we increase the tonnage number of cars the amount per ton decreases.

Another important element of train resistance is the condition of the track. Having upon my instrument apparatus for mechanically determining the condition of the track, it is found, even on the best roads, each mile cannot be in equal condition, owing to increased wear and quality of rail. On grades is this especially the case, and at stations where many trains stop and start. Experiments upon all classes of passenger trains are too limited to give any reliable formulas for general use. For long and heavy trains I have found the resistance per ton much less than that given by the latest formulas.

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Preparations for Observing the Transit of Venus.

Work has been begun by the commission created by Congress to determine the methods to be employed in observing the transit of Venus, and to take the preconcerted observations next December. The commission is composed of Vice-Admiral Rowan, Superintendent of Naval Observatory; Professor O. C. Marsh, President of the National Academy of Sciences; Professor Hilgard, Superintendent of the Coast Survey; Professor Newcomb, Superintendent of the Nautical Almanac; and Professor Hall, of the National Observatory. Washington, D. C., will be the most northern station, and will be in charge of Professor William Harkness. The other United States stations within our own territory will be at Cedar Keys, Fla., in charge of Professor John R. Eastman; San Antonio, Texas, in charge of Professor Asaph Hall; and Fort Thorne, New Mexico, in charge of Professor George Davidson. The foreign stations in charge of Americans will be at Cape of Good Hope, Professor Newcomb, assisted by Lieutenant Casey; Santa Cruz, Patagonia, Mr. O. B. Wheeler, late of the Lake Survey, assisted by Mr. Wm. Bell and Mr. Irvin Stanley, photographers; Santiago, Chili, Professor Lewis Boss, of Dudley Observatory, Albany, assisted by Mr. Rock, of the Naval Observatory; and a New Zealand station, in charge of Mr. Edwin Smith, late of the Coast Survey, who will be assisted by Professor Pritchett, of Washington University, St. Louis.

All the foreign parties will set out before the middle of September; those for home stations not before the middle of October.

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A Monster Flagstone.

An immense flagstone, which is said to be the largest ever quarried in America, and is destined for the sidewalk in front of R. L. Stuart's new brownstone residence at Fifth Avenue and Sixty-eighth street, stretched across the avenue from curb to curb yesterday, and made it necessary to close the street between Sixty-eighth and Sixty-ninth streets. The great slab is of river bluestone, and measures 26 feet and 6 inches by 15 feet and 6 inches. It is 9 inches thick, and weighs over 30 tons. If raised on edge it would make one side of an average seashore cottage. It is perfectly smooth, with the exception of a slight ridge through the center, which will be removed after it is in position. The stone was cut from the same quarry in Sullivan county as the great flagstone now composing part of the sidewalk in front of the Vanderbilt mansion, but it is much larger. It was brought down the Hudson from the quarry on the deck of a barge, and unloaded at the foot of Fourteenth street by being raised high enough with "screw jacks" for two heavy flat stone wagons to be placed under it, when it was drawn to its destination by eighteen powerful horses.

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An Index to Public Documents.

The vast amount of valuable information buried in public documents is to be made accessible by means of a classified, analytical, and descriptive catalogue of all government publications, from the foundation of the government to the present time. At the last session Congress provided an appropriation of $10,000 for the work, which will be done under the direction of Major Ben. Perley Poore.

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IN our description of the horse power hoisting machinery made by the Contractors' Plant Manufacturing Company, 296 Exchange Street, Buffalo, N. Y. (issue of August 12), the titles to Figs. 2 and 3 of the engravings were in some way transposed. Fig. 2 is a horse power for miners and builders, and Fig. 3 is the horse power for contractors. These machines, although similar in appearance, are somewhat different in their proportions. We learn from the manufacturers of these machines that they are being rapidly introduced, and are everywhere giving excellent satisfaction.