spiracy. If it be a poor paper, it will probably be suppressed several times before it gets published; and no one is to blame for that but its author. But a general conspiracy among men of science to suppress views because they are new, and unacceptable to old fogies, is impossible; and your correspondent and the Duke of Argyll must certainly know that fact; and it will remain a fact, in spite of any number of instances of special local repression that can be cited. When such repression happens, the fault lies with the man of new views, who will not or can not speak out boldly; who will not or can not make his conclusions irresistibly; who is too shy, or too limited in his personal associations, or too obscure in his language, to compel general attention to what he believes.

Younger men of science with new ideas seem to think that older men in science have no business of their own to attend to, but must drop all their personal investigations to discuss and investigate, prove or disprove, each new theory as soon as it is promulged. The fact is, every new presentation in any department of science is read with interest and attention by scores, hundreds, and in some rare cases by thousands, of experts working in that particular department. But, if it be an important new theory, it requires, on that account, to be carefully studied; which, of course, takes time, — months, sometimes years. The delay will always be in proportion, first to the importance, and second to the difficulty, of the subject-matter of the theory. The few whom it most interests are separately making up their minds about it, and consulting each other. The wisest and strongest minds take the longest time, resisting all pressure to force them to a premature conclusion. But there is a personal equation. Men of science differ greatly in their reticence and in their cautiousness. What is denounced by the author of the novelty, and by his friend or friends, as a conspiracy of silence, and a scandal to science, is in fact the involuntary cautiousness of men who know much and have been often mistaken; and it is the glory of science that it keeps its head level, as it keeps its eyes open and its heart warm. Let your correspondent reflect that there are two natural classes of men of science, — the daring and useful, and the cautious and useful. Both classes are equally useful and equally honorable; and the charge of a conspiracy of silence can no more justly be brought against the one class than the charge of a conspiracy of notoriety against the other.

Whenever "Mr. Bonney says that the scientific method is to wait, and not to investigate," I shall go to London to ask him what he can mean by such language; but if I have to wait until he actually says so foolish a word, I shall never again see London. In fact, Mr. Bonney never has said any thing of the sort, in the sense assigned to his words by your correspondent; meaning by 'scientific method' the mode of pursuing truth proper for all the pursuers of truth. What he meant in his rebuke of the Duke of Argyll is evident: he meant that any one man of science not engaged in a given special line of research can not and dares not make up his own mind as to the validity of one of two opposing theories until those others who have that special line of research in hand have practically reached some consent on the subject.

Your correspondent's quotation from Professor Bonney (on p. 299, footnote) does him another injustice. Mr. Bonney writes, "Very well, but there are some people, not very few in number, who do not share the opinion." Your correspondent exclaims, "Hail to the new science! The voice of many people is the voice of God." But the people of Mr. Bonney are not the people of Mr. Buel. Professor Bonney has said plainly enough that by 'people' he means such men as Darwin and Dana, the greatest investigators of these special coral phenomena. If Mr. Murray's 'people' are numerous, Mr. Darwin's and Mr. Dana's 'people' are also numerous. Most of the 'people' on both sides are of no value as reasoners on coral formation; but a few — a very few on both sides — have some right to an opinion. But Mr. Huxley and Mr. Bonney do not claim to be of these few — on either side. Of course they wait.

It is a curious fact, and rather pathetic withal, that a man of science seldom or never opens his mouth but he puts his foot in it. At all events, there is always some half-man of science standing by ready to say so, and run for a doctor. But curious and even pathetic as the fact may be, it has its good and its bad consequences: it makes thoroughbred experts more cautious, both in framing their own opinions respecting the researches of others, and in expressing such opinions publicly; and it makes experts of the second, third, and fourth order of breeding correspondingly reckless in both thinking and speaking.

J. P. LESLEY.

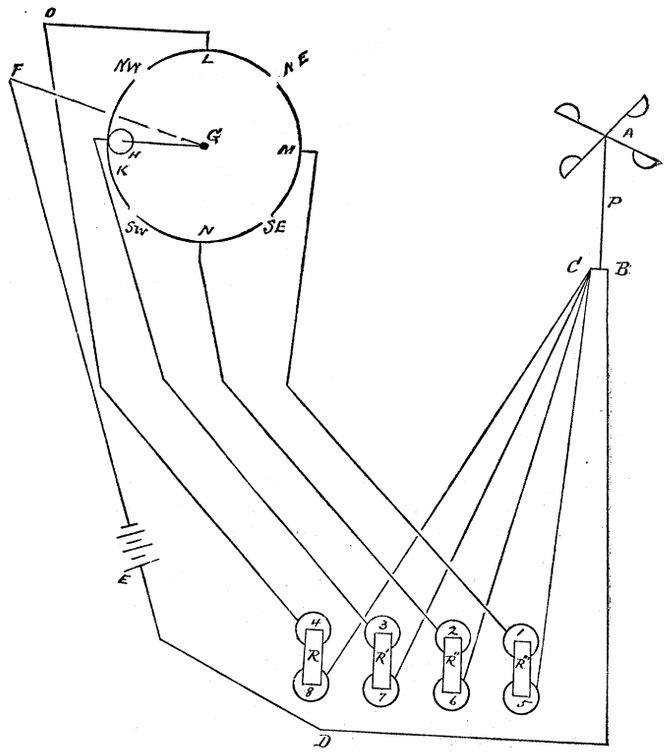
Philadelphia, Dec. 19.

A Wind-Register for Direction and Velocity.

FOR some years it has been considered very important that not only the total amount of wind should be recorded on self-registers, but that some simple means should be brought into use by which the recording sheet should give directly the number of miles or kilometres per hour of wind blowing from the various points of compass.

The plan usually adopted is to mark off on the velocity record the spaces of time during which the wind was blowing from the various quarters as indicated by the record sheet for the directions, or the direction is stamped on the velocity sheet at regular intervals of time (say, every ten minutes) by the automatic closing of an electric circuit by means of a clock.

A method of registering the wind's velocity so as to give a minimum amount of labor in reading the recording sheet has suggested itself to me, and I have given below a short account of the principles of construction. I do not remember having seen mention of



such an apparatus before, but it is so simple that it is probably not wholly new; and a similar form of instrument may even be in actual use, but, if so, I cannot recall any such, and I am somewhat familiar with the instruments of the various meteorological observatories.

In the accompanying figure, A represents the Robinson anemometer; P, the supporting frame; and C and B, the posts to which the conducting wires are attached in the ordinary form of electrical self-registering anemometer, in which C and B have metallic connection through P at the completion of each mile or kilometre of wind as shown by the anemometer dial: at other times the connection between C and B is broken. By means of a wire, B is connected with one pole of the battery E. Wires also pass from C to binding-screws on 5, 6, 7, 8, electro-magnets of the recording apparatus.

The left-hand part of the diagram is shown in horizontal plan. G is the lower end of a rod passing from the roof to the room beneath. This rod being in rigid connection with the wind-vane, it will revolve with the latter. Near the lower end of the rod, at G, an arm is placed at right angles to the rod, and terminates in the small friction-wheel H.

This wheel *H* runs along a metallic rim encircling *G;* the rim not being continuous, but having small breaks at the points touched by the wheel *H* when the vane points *N E, S E, S W, N W.* These breaks are so short that when *H,* in its revolution around *G,* leaves one segment of the rim, it almost instantly rests against the next.

The segment *L* is connected with the binding-screw of 4, by the wire passing through *O.* Similarly *K* is connected with 3, *N* is connected with 2, and *M* is connected with 1.

The wire *G F* is in metallic connection with *G H,* and is also connected with the free pole of the battery *E.*

We will now suppose that the anemometer and vane are exposed to the wind, and the wind is from the west. We shall then have the arrangement shown in the diagram.

The metallic connection *C* 7 3 *K H G F E D B* will be complete; and whenever the anemometer closes the circuit *B C,* the armature *R'* will be attracted by the double coil magnet 3 7. So, for any winds between *S W* and *N W,* the armature *R'* will indicate each mile or kilometre of wind. Similarly the armatures *R, R'', R'''* will indicate northerly, southerly, or easterly winds.

By attaching recording pencils to the armatures *R, R', R'', R,'''* and allowing a chronograph sheet to pass beneath them, we can register in separate columns the amount of wind from the four points. By doubling the number of segments, electro-magnets, and recording pencils, the velocities can be recorded for eight points of compass.

The recording pencils can be made to register their marks in lines running side by side and parallel, and within narrow limits, by bending the pencil-holders attached to the armatures in such a manner as to bring the pencil-points close together, and into an alignment transverse to the motion of the recording sheet.

In reading the record sheet, the sums of the registrations in the separate columns will give directly the amount of wind blowing from the different quarters.

So far as the apparatus for wind, direction, and velocity is concerned, the method that I have here described is applicable to most of the electrical registering anemoscopes and anemometers now in use, with very little change; but the registering apparatus (chronographs, pencils, electro-magnets, etc.) will require more alteration, especially for the American form of cylinder chronograph. The European chronographs, with the long narrow paper strips for recording sheets, will answer the purpose very well, and they are usually of much better construction than the cheaper American chronographs.

In actual practice a single wire connecting *C* 5 6 7 8 would be used in place of the four wires shown in the diagram (*C*5, *C*6, *C*7, *C*8).

It might perhaps also be found best to make a continuous record of the wind direction by means of a cylinder encircling the rod *G* with a sliding pencil, the motion of this last being regulated by the chronograph clock-work. FRANK WALDO.

Cincinnati, O., Dec. 14.

American Microscopes.

THE complaint which Dr. Minot makes in a recent number of *Science* (x. No. 252) about the tendency of American microscope-makers to furnish instruments which are much more decorative than useful, and which are seriously lacking in the optical excellence which the genuine scientific worker requires, expresses, I think, the feeling of every one who is frequently called upon to purchase microscopes, or advise about their construction.

It seems to me, however, a matter for regret that Dr. Minot, through inadvertence, I feel sure, should have made so sweeping and indiscriminate a condemnation of all American microscopes. I think that he must have been unaware of the excellent instruments which have been furnished of late from the workshop of J. Grunow in New York.

The useless and positively objectionable features which Dr. Minot so justly attributes to the American microscope in general, are absent from these new forms of stand, while the requirements which he so admirably summarizes are just those which Mr. Grunow has succeeded in covering.

A firm base; low, large solid stage, with simple clips for the slide; excellent brass-work; with or without knee, nose-piece, and rack and pinion, coarse adjustment, Abbé condenser, as the purchaser may desire; and optical qualities in the lenses which bring them strictly within the category of first-class, — these are the qualities which the new Grunow instruments present. Forty of these microscopes have recently been added to the supply of the laboratory of the Alumni Association of the College of Physicians and Surgeons, New York, after a full personal examination of instruments supplied by the more prominent continental makers.

I feel greatly indebted to Dr. Minot for clearly indicating, as only an accomplished microscopist like himself could, the direction in which American microscope-makers should work, and I am certain that he will learn with pleasure that by one American maker at least, his requirements are being scrupulously met.

T. MITCHELL PRUDDEN.

New York, Dec. 12.

THE issue of *Science* of Dec. 2 contained an article which is so sweeping in its denunciation "of any microscopes whatsoever of American manufacture," and its commendation of the German or French instruments, and places the motives of American manufacturers in such questionable light, that as one of them, and especially in consideration of circumstances hereinafter mentioned, I consider it proper to say something in answer.

The objections in the article can be enumerated as follows: —

1. "The fundamental error in microscopes of American manufacture is that they are for the most part constructed with a view of, I might almost say, entrapping inexperienced purchasers. The zeal of the maker is turned too much to decorative lacquering and nickel-plating; he adds to his stands as great a variety of mechanical contrivances and adjustments as the price of the stand will permit, and many of these contrivances are not really commendable for their utility."

The supply of a product is created and controlled by the demand for it. As the microscope is an instrument for scientific research, it is used by a class of people of more than ordinary intelligence; and, as most of the instruments purchased pass through the hands of persons of wide experience, they are fully capable of determining what is best suited to their wants, and will certainly not permit the maker to prescribe what they should take. The American instruments as constructed to-day are almost generally a combination of improvements, such as have suggested themselves to the practical mind of the advanced American worker, and which have been adopted and carried out by the maker; and this co-operation between worker and maker has long been a matter of congratulation. That the majority of American innovations are real improvements is shown by the fact that the need of them is felt abroad, and that many of them are being gradually embodied into foreign instruments. That the American maker "adds to his stands as great a variety of mechanical contrivances and adjustments as the price will permit," is certainly not to his discredit, neither is the fact that he endeavors to make the outward appearance of his instruments conform to that of its general workmanship.

2. "In the majority of cases the stands are made to tilt, which, for one that uses the microscope for real work, is an almost useless luxury."

Whether an instrument shall be used in an upright or inclined position depends upon the requirements of the worker. It is true that "in the majority of cases the stands are made to tilt;" but as this feature adds, not a considerable, but, on the contrary, a very trifling expense, there is no reason why it should not be used continually in an upright position if so desired; and it gives the additional advantage that it may be inclined, and there is no doubt that much real work is accomplished when it is in this position. However, instruments without the joint are catalogued by some makers, and may be had by those who desire them; but the fact that the maximum ratio of instruments without joint, as against those with them, is as 1 to 100, is sufficient evidence of the desirability and inexpensiveness of the hinge.

3. "This same fact . . . renders it indispensable that the microscope should not be too high, . . . so that we must put down the ten-inch tube as a bad feature for a student's microscope."