Correspondence.

THE ART OF CURVE PITCHING.

To the Editor of the Scientific American:

I notice in your last number (July 31) a paper on "The Art of Pitching in Baseball." Being myself slightly acquainted with both the science of baseball and of physics, I should like to state a theory which, although neither new nor original, I think explains correctly the phenomena of curved baseball pitching.

The article mentioned states, in substance, that the horizontal rotary motion given to a ball as it is thrown from the hand of the pitcher generates, as it passes through the air, more friction on one side of the ball than on the other. This unequal lateral friction, the author states, causes "a curve in the line of its delivery in the direction of the side on which its progress has been retarded."

If this were the case, this theory, as stated in your columns, might be a sufficient explanation to the casual observer. But if we examine the subject practically, we shall find that a baseball curves in the same direction in which its face or forward half is rotating; and *not*, as stated in the article, toward the side of greatest frictional resistance.

A simple experiment will be sufficient to show plainly the direction in which a ball curves while under the influence of these two horizontal motions.

Take a ball of yarn and an empty spool, run a piece of heavy wire through the axis of both, suspend this device by a long piece of thread from the ceiling (Fig. 1). We have now a pendulum, the ball of which

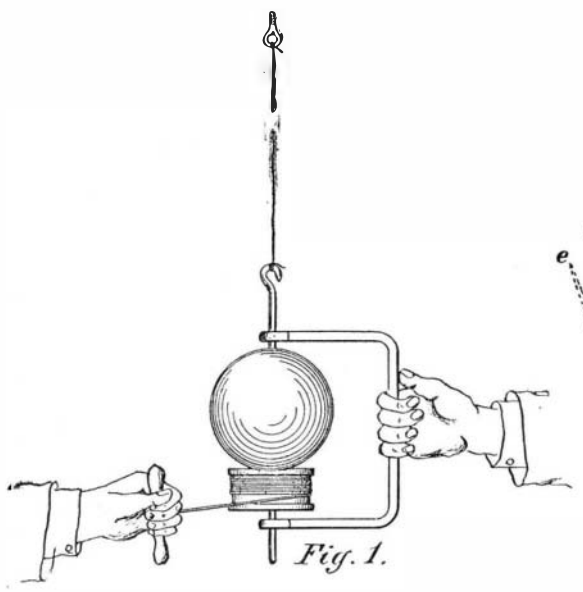

Fig. 1.

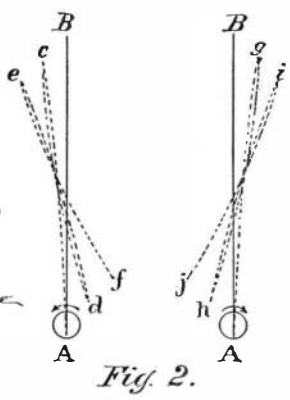

Fig. 2.

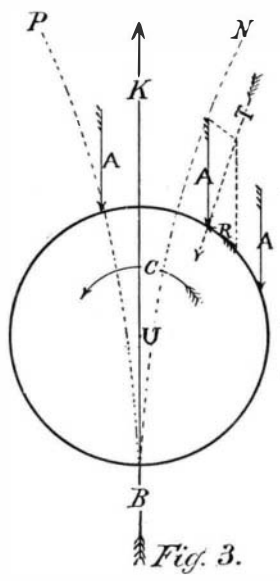

Fig. 3.

can be made to rotate in either direction by simply winding a stout piece of string about the spool and drawing this off suddenly, while at the same time the two ends of the wire axis are held by a piece of wire bent as shown.

Let us now imagine the eye of the observer to be at the point in the ceiling from which the pendulum is suspended. Looking down from our elevated position on the ball as it swings without rotary motion, we will see it apparently describe a straight line as it vibrates to and fro. If, now, we start the ball swinging in a straight line, at the same time giving it a rapid rotary motion about its own perpendicular axis (by quickly drawing off the string wound about the spool), then we shall see that the ball does not traverse back and forth as on the straight line, A B (Fig. 2), but moves in a curve, A*cdef*, etc., or A*ghij*, etc., depending on the direction in which the ball is rotating. We conclude from this experiment that a ball curves in the direction in which the forward half is rotating, and not toward the side of greatest frictional resistance. If we next examine the forces acting upon a ball in its flight through the air, we will easily be able to discover the origin of the force which tends to deflect it from a straight line.

Let Fig. 3 represent a ball moving through the air in the direction of the arrow, B K, and at the same time revolving about its vertical axis, U, in the direction of the curved arrow, C. Let A A A represent the retarding action of the air acting on different points of the forward half or face of the ball. The rotary motion, C, generates a *current of air* about the periphery of the ball, a current similar to that caused by the revolving flywheel of a steam engine.

If, now, at a point on the face of the ball we let the arrow, R, represent the direction and intensity of this *rotary current* of air, and if at the same point we let the arrow, A, represent the direction and intensity of the retarding action of the air, then we will find by constructing a parallelogram of forces that the resultant or combined effect of these two currents acts in the direction indicated by the dotted arrow, T. In other words, we have a sort of compression, or force of air, acting on the face of the ball in the direction indicated by the arrow, T. This force, as we can readily see, tends, when combined with the original impetus given to the ball, to deflect or cause the ball to curve in the direction of the dotted line, B P, instead of maintaining its right line direction, B K. If the ball rotate about its vert axis in the *opposite* direction, the curve, B N, will be the result.

The remarks in the article, in regard to the handling of the ball to produce the required curves, seem to be perfectly correct; but I think, on examination, you will readily see how the theory and practice as there set forth do not hold together. S. M. C.

New York, August 3, 1886.

Kilauea Again Active.

To the Editor of the Scientific American:

I have been spending a few weeks at the Volcano House, crater of Kilauea, Hawaii, and while there I read a leading article in your valued journal giving a brief account of the extinction of the fires in the grand old volcano. As I had the pleasure of seeing the liquid lavas return to the great pit covered by the "break-down" of last March, and for two weeks after they were seen again watched their gradual increase, I thought you might be pleased to publish the fact—for such it is—of the renewal of activity at that spot.

From careful observations made almost daily for four weeks, I am persuaded that the liquid contents of the great lava lakes, which disappeared at the time of the collapse of the walls of the pit in which they were seen, did not go far from their surface home, as there exist now in the great floor of the caldron—which is about nine miles in circumference—huge caverns, some of which are over a hundred feet in depth and fifty or sixty feet in diameter. I think it but reasonable to suppose that one or more fissures opened suddenly in this floor, and through these the liquid lava disappeared. There has been no outbreak of lava from the sides of the mountain of Mauna Loa, on whose flank, at an elevation of 4,440 ft., the caldron of Kilauea is located; and as the molten lava formed a lake in the midst of the sunken pit on the 1st of this month, and two others broke out near the first one, on the 9th, and as all three have been increasing in size since then, I think you can safely say that Kilauea is once more active. The greatest living crater in the world is again displaying all the wonderful phenomena of intense volcanic energy, and that, too, at points where it can be seen in absolute safety and comfort.

F. L. CLARKE.

Honolulu, H. I., July 23, 1886.

A Problem for Astronomers.

To the Editor of the Scientific American:

At 8 o'clock on the evening of September 20, 1877, I observed that the moon, Saturn, and Mars were at such positions in the heavens that they formed the apices of an equilateral triangle, the moon being nearly full and forming the upper apex, while Saturn and Mars were in the same horizontal line, the first toward the north and the second toward the south. The angular value of the sides of the triangle was 7°. I should like to know when these three heavenly bodies will be again in the same relative positions.

Several solutions have been attempted, but as they do not agree, and I have also failed to make one myself that is satisfactory or susceptible of demonstration, I wish very much that some of the readers of your journal would work out the problem, as well for my individual gratification as for that of others who are interested in the mathematics of the most sublime and beautiful of all the sciences.

J. B. TAPSCOTT, C.E.

Clarksville, Tenn., June 7, 1886.

THE amount of pressure per square foot with the wind blowing at 20, 30, 40, 50, 60, 70, and 80 miles an hour is espectively 2, 4½, 8, 12½, 18, 25, and 32½ pounds.

M. Pasteur's Cure of Hydrophobia.

C. R. Drysdale, M.D., Senior Physician, Metropolitan Free Hospital of London, writes as follows to the editor of the *Lancet:*

Having during the past week seen more than 250 inoculations performed in the Rue Vauquelin, and read over a number of the histories of patients operated on by Dr. Roux, I have come to the conclusion that there is no longer any reasonable doubt of the immense advance made in therapeutics by M. Pasteur's process for the cure of hydrophobia. The statistics are so telling that no one, I think, can read them without feeling convinced that an all-important discovery has been made. M. Grancher, whose abilities as a physician all are aware of, takes the date of April 22, 1886, as the one which allows of his drawing a conclusion warranted by the length of incubation of hydrophobia, and then shows that M. Pasteur has treated ninety-six cases of persons who had been bitten by dogs which were proved to be rabid because other animals bitten by them had died rabid, or because rabbits inoculated from their brain and spinal cord had succumbed to the disease. Of these ninety-six cases there was only one death. Again, of 644 cases of bites by dogs which were certified as rabid by the veterinary practitioner of the commune when they were bitten, only three of those treated died. Taking these two groups together, the death-rate of those treated was only 0·75 per cent., against 16 per cent, which is the death rate assigned to a similar set of cases by M. Leblanc, veterinary surgeon of the city of Paris, where patients had been treated by other methods. In addition to these, M. Pasteur has treated forty-eight persons bitten by rabid wolves, and seven of these, or 14 per cent., have died, whereas the death rate of persons bitten by wolves has been shown by M. Brouardel to be 66·5 per cent. Putting these facts together, M. Grancher contends with truth that Pasteur's treatment is twenty-three times as successful against the bites of dogs as the treatments of past times. I may add that the treatment seems to me to be perfectly and absolutely innocuous, and that the only pain felt by the patient consists in the prick given in the abdomen by the injection syringe, ten times on ten consecutive days. The process, too, of inoculating the rabbits is now so simplified that there can be not the slightest reason, except popular prejudice, why M. Pasteur's inoculations should not be performed in every country. All that is required is that an inoculated rabbit should be imported, and then that other rabbits should be inoculated from it at its death. In this way the practice of inoculations might become at one generalized in every civilized country so long as rabies exists, which, of course, it will not do when the muzzling of dogs is as well carried out as it is in Berlin and North Germany. In the mean time, all persons bitten by suspicious dogs should without any delay avail themselves of the noble offer of M. Pasteur to cure them of the most fatal of all diseases.

Paris, June 3, 1886.

P. S.—This morning 102 patients were inoculated by M. Roux at the Rue Vauquelin.

The Dirt in the Wheat Crease.

Concerning this vexatious point, R. J. Abernathey says: "There is dirt that comes from somewhere, that is found after the first break, but I am inclined to think it is what is rubbed off the end of the berry, the hair or fuzz, and loose fine cuticle not rubbed off by the smutter, and possibly comes from that part of the bran covering lying in the crease and not detachable by previous scouring. In fact, I believe that about all so-called crease dirt consists of the cuticle rubbed off and the fuzz rubbed off the end, which it still seems ought to be scoured off by scouring off the whole grain. I have often examined split grains with a magnifying glass, and have never been able to discover any detachable crease dirt, except the possible cuticle referred to. I find a vegetable integumentary growth at the bottom of the crease, thicker than at any other part of the berry, which is sometimes turned back, but it can never be dislocated by splitting the berry nor by subsequent brushing and scalping, it being tough and only removable with the aid of the point of a knife blade; hence that is not crease dirt."

An Optical Illusion.

M. De Parvelle has called the attention of the French Academy of Sciences to a curious illusion of the vision which may account for the apparent oscillation or swinging of stars sometimes observed, and called by the Germans *Sternschwanken.* When the eye looks for some time at a small, feebly lighted body, itself being in complete darkness, the body appears to oscillate or describe certain curves. It is a phenomenon of the subjective order, and appears to be of the same nature as the movement of a star observed when a person leans the head against a wall, and fixes his eye upon the star. The star appears to be agitated in its place and to oscillate rapidly. In order that the motion may be noticed, there should be no moon, and the sky should be clear. A lunette takes away the apparent motion.