Correspondence.

The Leap-Frog Car.

To the Editor of the SCIENTIFIC AMERICAN:

Suppose the north-going car is exactly on the top of the south-going car, the rate of speed of both being 4 miles an hour, but in opposite directions. Then the south-going car is traveling 4 miles an hour with reference to the motionless ground. But the north-going car? Its rate of speed is 4 miles an hour, but its absolute rate with reference to the motionless ground is equal to its own rate of speed less the absolute speed of the car it is traveling on, that is $4 - 4 = 0$. So the upper car is stationary with reference to the motionless ground, and the cars are passing at 4 miles an hour.

A pretty problem is this: Suppose *part* of the north-going car is on the ground rails and part on the south-going car. Assume that part of the north-going car on the ground rails is traveling north at 4 miles an hour, and the south-going car is traveling south at 4 miles an hour. At what rate of speed *relative to the south-going car* is the part of the north-going car which is *on* the south-going car traveling?

J. C. CONSTABLE.

Wick Court, near Bristol, England, September 30, 1905.

[The answer to this question is evidently 8 miles an hour, or the sum of the speeds of the two cars.—ED.]

A Curious Rainbow Phenomenon.

To the Editor of the SCIENTIFIC AMERICAN:

Question 9811 reminds me of an experience I had about the year 1874, in southwestern Wisconsin. I was living on an east and west ridge of high ground sloping both to the north and south. South of me was farming land, visible as far as three and a half miles. North was timber; also on the east and west was timber for one-fourth mile. There had been a shower of rain about 4 P. M. in midsummer, and it was still "drizzling" when I went out into the clearing looking south to see about the weather. I noticed just west of me over the timber a full-sized rainbow with its north end near me. It seemed strange to see a rainbow at that time of day, to westward, so I took particular notice of it, and it seemed to move eastward. I could tell by the color of the foliage on the trees just to westward. In a few moments the colors appeared on the open ground coming eastward and approaching where I stood, at first about one hundred yards away, then closer and closer till I saw them (the colors of the rainbow) all about me, and by extending my hand I could see them between my eye and my hand. The same rate of travel being kept up soon put the colors to the east of me, and on they moved to the end of the field eastward, and there again colored the foliage on the trees to the east, and the circle of the bow appeared smaller as it receded, and after a few moments more it was the usual customary rainbow in the east. I have been seeking for some one ever since who has had a similar experience, but I have found none, and if nothing comes of it through the Notes and Queries column, I will give up trying to find a duplicate case.

JOHN M. IRMEN.

Louisville, Ky., October 21, 1905.

Some Observations of Bird Flight.

To the Editor of the SCIENTIFIC AMERICAN:

I recently found myself in a position to confirm the conclusions about the connection of upward current of air and the soaring of birds, etc., as set forth by your correspondent, J. E. Walker, in your issue of the 14th. About the last days of the past September I was gazing into the sky, and noted an extraordinary number of gossamers going south and rising rapidly. Some that were low showed streamers, and when I procured a field-glass and examined them closely, I found that all such, for hundreds of feet upward, had these streamers pointing almost directly upward from the great bunch or center of the gossamer. This indicated a strong upward current, which seemed to be so local as to have had its origin only about a fourth of a mile northeast of me; but this may have been an erroneous impression. Later, I began to notice an occasional butterfly, of the usual large brown kind, known as the "milk-weed butterfly," sailing rapidly with the current when high up, while later still I saw many making spiral mountings, with not a wing-flap, in the well-known manner of turkey vultures, hawks, etc. The number of these rapidly increased, as did that of the gossamers, as if they had become suddenly aware of the uprush of warm air and determined to take advantage of it. Much later still others of this species came past me, sailing with the wind, at a very rapid speed, equaling that of the usual bird in direct flight. These were all rather low down, some having to rise to pass the tree-tops. I saw no birds taking advantage of this peculiar condition, except that I noted the chimney swifts hawking at very great heights, where the insects had so evidently gone.

Inasmuch as I have always observed vultures, hawks, and other soaring birds engaged in these rising circlings under peculiar atmospheric conditions, usually those just preceding a change, I am inclined to the same view with Mr. Walker—that soaring creatures take advantage of these upward currents; and I am strongly inclined to doubt that they can soar under any other conditions for any great distance in a direct line. It is well known, however, that by drifting away with a strong breeze and constantly circling against it vultures can rise, but this is easily accounted for by the two different shaped surfaces which the bird presents, "going and coming."

JAMES NEWTON BASKETT.

Mexico, Mo., October 18, 1905.

AUTOMATIC APPARATUS FOR WATERING PLANTS.

The essential part of the first device is a long, untwisted wick such as is used by lamplighters. These wicks are about five feet long and the threads of which they are composed are easily separated. The wick is protected by a glass tube about three feet long and about one-quarter inch bore, which is bent in a flame

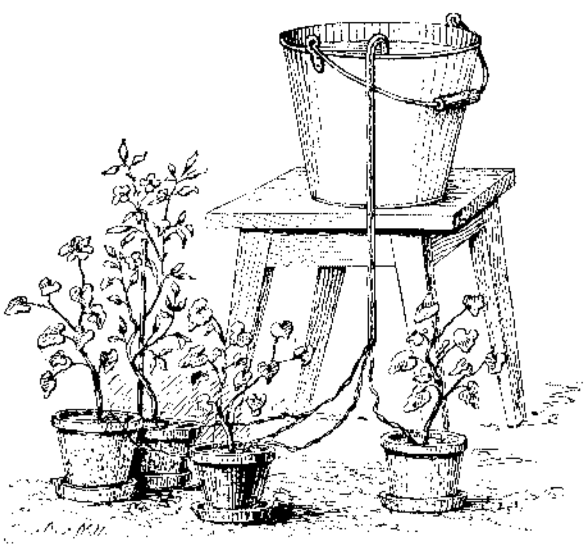

Fig. 1.—AUTOMATIC APPARATUS FOR WATERING PLANTS.

into a siphon or U-shape with one leg very much longer than the other. The wick is drawn through the tube with the aid of a flexible wire, and is allowed to protrude at both ends. It takes up water slowly at first, and the tube containing the wick should be left over night in a vessel of water.

To use this device for watering potted plants, three or four pots are placed near together, and a pail of water is put near and above them, on a bench. The short leg of the tube is immersed in the water and the flow is started by sucking at the other end. The strands of the wick are distributed among the pots, being placed in contact with the earth but not with the stalks of the plants. One or more strands are assigned to each plant, according to its need of water and, of course, the entire flow may be given to one pot, in which case the end of the tube is inserted in the soil. In very hot weather it is advisable to cover the pail and wrap the tube with wadding to prevent the wick drying. The German inventor of this device says that he has always found it to work perfectly. It was designed for watering house plants during the absence of their usual caretakers, but it seems adapted to garden use as well. Furthermore, it is not apparent why a tube of rubber, tin, iron, or lead should not answer the purpose as well as the fragile glass tube. The second device, patented in Germany a few years ago, is still simpler. It consists of a pear-shaped glass bulb drawn out to a point at one end. The point itself is closed but near it is a lateral opening, through which the vessel may be filled with water. When filled it is thrust into the earth near the plant to which it supplies the proper quantity of water for several days or weeks, as the water flows from the hole with greater or less rapidity, according to the dryness of the soil. The apparatus is furnished in a number of sizes, holding from a gill to a gallon.

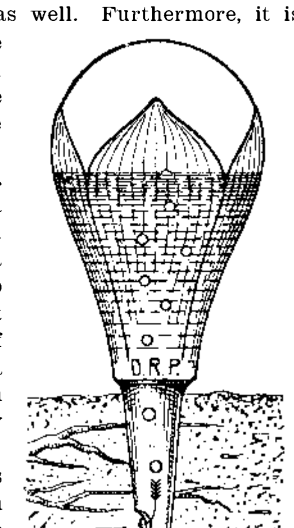

Fig. 2.—AUTOMATIC APPARATUS FOR WATERING PLANTS.

Either of these devices offers a convenient means of applying liquid or soluble fertilizers, which may be added to the water in any proportion desired. Adapted from Umschau.

Engineering Notes.

The New York Central Railroad has placed orders with several manufacturing companies for a total of 25,000 freight cars, calling for the expenditure of about $25,000,000. The tremendous scale on which the railroads are now providing equipment indicates the pressure under which they are working to care for the traffic that is being offered to them.

Forced draft dates back of course to Stephenson's "Rocket," and its first use for marine purposes was by Mr. Robert L. Stevens on the Hudson River steamers in our own country prior to the civil war. During that war Mr. Isherwood built a number of gunboats which used forced draft, but it had fallen into disuse until about 1882 for naval vessels, when it was introduced into the English navy, and still later was applied in the merchant service.

The history of early engines has been amplified by discoveries recently made by the Engineer, of London. The oldest known print of a steam engine is in the Birmingham Public Library and shows a machine built in 1712 by Savery and Newcomen. A search made by the journal mentioned has brought to light an old engraving dated 1725 and entitled "The Engine for Raising Water by Fire." It is unique in containing the first illustrated description of a steam engine. This machine is somewhat different from that portrayed in the earlier engraving, for the boiler is fed with a portion of the hot water coming from the bottom of the cylinder or hotwell. This fixes the date of the improvement described by Desaguliers in his "Experimental Philosophy" as follows: "It had been found of benefit to feed the boiler with warm water coming from the top of the piston rather than cold water, which would too much check the boiling, and cause more fire to be needful. But after the engine had been placed some years, some persons concerned about an engine observing that the injected water as it came out of the induction pipe was scalding hot, when the water coming from the top of the piston was but just lukewarm, thought it would be of great advantage to feed from the eduction or injected water, and accordingly did it, which gave a stroke or two of advantage to the engine."

An excellent example of a concrete building in which are embodied new fireproof ideas is furnished by the power house recently completed for the Baltimore Electric Power Company. This power plant, which covers an approximate area of 72 by 180 feet, is considered absolutely fireproof. It rises to a height of 70 feet above the main floor, and every foot of this space is conserved and utilized to the best advantage. The manner in which the concrete is reinforced in this building has many features of interest. Instead of using the ordinary steel rods for the reinforcement of the floor slabs between the I-beams, the engineers selected Clinton electrically-welded fabric, first because with the long lengths in which it comes they were able to make the reinforcing continuous for the whole width of the building. This continuous bond is a great feature in adding strength to the structure. In the second place, the cross wires not only serve to hold the main reinforcing members in their exact positions, but they take up whatever strain may be exerted in the opposite direction. The feature of having a reinforcing material which the workmen cannot misplace is one of the strongest points of this system of reinforcement, because it obviates the necessity of using many high-priced inspectors to watch every detail of the work, and guards against the mistakes which may be made by the misplacing of ordinary reinforcement. The upper third of the building contains the coal pockets. In supporting the great pressure to which these floors are subjected, the continuous bond shows to the very best advantage. As the thickness of the slab is but six inches, it is obvious that but for the continuous bond this floor, with its five-foot spans, must have been heavier and also of the more expensive segmental arch construction. Water is supplied to the condenser from the bay, 600 feet distant, through conduits which furnish a particularly interesting example of the application of Clinton reinforcement. These conduits are five feet in diameter. The entire circumference is reinforced by a continuous bond of wire fabric. These conduits are buried under 30 feet of clay, and the reinforcement is so placed as to resist this pressure on the under side of the four-inch crown. The reinforcement spreads away from the exact circumference on the bottom of the conduit in such a way that the bottom is embedded in the concrete to a depth of 12 inches. The concrete is thus laid in order to resist the upward pressure of the water, as the conduit is several feet below the level of the bay. This application of the Clinton fabric is similar to that in the construction of concrete piles, which to an increasing extent are supplanting the wooden piles.