Correspondence.

Why Not "Air-plane"?

To the Editor of the Scientific American:

Air-plane is a much better word than aeroplane.

It is as good etymologically, and much better when it is spoken. Arthur C. Kimber.

New York City, December 13, 1906.

Liquid Specula for Astronomical Purposes.

To the Editor of the Scientific American:

Your discussion with Sir H. Maxim concerning the "Magic Sphere" and man's "gravitational sense" suggests a subject of extraordinary interest to me. It is now nearly twenty years since I conceived the idea of employing the same two forces (gravity and centrifugal) to produce a telescopic mirror. The reflecting surface was to be mercury, to which a parabolic figure was to be imparted by causing it to rotate. I made numerous experiments with revolving liquid specula, which were not discouraging considering the crudeness of the methods employed.

I endeavored to determine the nature of the curve which the surface of a rotary fluid must assume to reach a state of equilibrium, and searched numberless scientific and mathematical works for a clew to this problem. But so far as I could discover, all authorities were silent upon this point. Pondering the matter for years, I was at length able to decide with some degree of certainty that the curve was really parabolic; but a casual word let fall by you in your reply to Sir H. Maxim was the first and only confirmation of my conclusion which I have yet seen.

In the year 1897 I published in the Leader (Melbourne) a short story entitled "Lindsay's Vision," in which the suggestion was advanced as the nucleus of a scientific romance.

A telescope constructed on the above principle would possess qualities which might be of prodigious advantage, though plainly subject to certain inherent defects; chief among the latter is the necessarily fixed position of the mirror. But assuming it to be possible by mechanical means to put the reflecting fluid into a smooth and uniform state of rotation, we should obtain a parabolic mirror of incomparable precision, with practically no limit as to size. With respect to smoothness or polish, I think the surface of a fluid *at rest* is as perfect as can be conceived, approximating indeed to the minuteness of its molecular structure. Also, the difficulty of mounting and danger of flexure would be completely disposed of, while that of transportation would cease to be an obstacle.

A telescope on this principle could be placed at any part of the world which is now accessible to man, but a situation at the summit of some tropical mountain would be preferable, since the moon and planets would in turn drift across the field of view.

Assuming my speculations to be thus far sound and practicable, there is yet the obvious objection that perfect optical performance must depend upon the position of the object viewed being coincident with the axis of curvature of the mirror—a condition necessarily both rare and transient.

But the problem thus presented would, in my opinion, be far less formidable than that encountered by the early makers of refracting telescopes, and which was met by the invention of the compound object-glass.

A. W. Nightingale.

Hobart, Tasmania, October 8, 1906.

A Solution of the Lock Problem Upon the Panama Canal.

Hon. Theodore Roosevelt,
President of the United States,
Washington, D. C.

Dear Sir: I beg herewith to offer through the columns of the Scientific American a plan for the construction of locks upon the Panama Canal which I believe will offer greater safety and less complication than any of the plans made public, with which I am familiar.

The contingency to be guarded against, as I apprehend it, is the possible destruction of a lock by a steamship out of hand, with a subsequent release of the waters of the lake in such volume as to endanger the entire structure below.

So far as I am aware of them, the proposed safeguards may be divided into two classes, the first of which is represented by a false gate, or buffer, which is to be thrown across each lock at fifty feet from its end, for the purpose of arresting the momentum of a ship out of hand; and the second, by normally-submerged devices consisting of horizontally-sunk or vertically-disposed cylinders, or other devices, which in the event that the lock gate is carried away, and the waters of the lake set free, are thereupon to be thrown across the basin at the mouth of the principal lock.

The first plan, of arranging a buffer ahead of each lock-gate, assumes that a movable barrier can be provided which shall be amply strong to absorb the momentum, before it can reach the lock-gate but fifty feet beyond, of say, a heavy battleship which may be sent ahead through the mistaken reading of a signal, at quarter or half speed.

I beg to submit that reliance upon the strongest structure of this kind that can be provided is not well founded in experience or human nature; for if it be made stiff enough to resist the ram of a 20,000-ton battleship moving at a slow speed, there is no assurance that such a ship out of hand may not develop much higher speed, or that the device may not in time have to be called upon to insure the arrest of a very much heavier vessel.

The second plan, in any of the forms which have been made public, seems to be more unworthy of confidence than the first, for it assumes, first, that the submerged devices used shall always be clear of silt, or gravel, or growths, and that they shall be free to move always with mechanism in instantly workable order; second, that once a gate has given way and the lake has started out there will be sufficient presence of mind on the part of those in charge to set the devices to work promptly enough to avoid the instant damage below which must follow the first onrush of the waters of the lake; and third, that the waters of the lake, once under way, can suddenly be arrested without their sweeping away the strongest surrounding works.

It is likewise respectfully submitted that none of these assumptions is well founded in experience, and that to intrust the safety of such a tremendous project, and the lives which necessarily must always be at stake, to such flimsy devices and to the courage, quickness, and wisdom of the employees in charge upon the occasion of a serious mishap, is neither wise nor necessary in the present state of engineering science.

As a substitute for the safeguards discussed, I propose these simple expedients, which are free of untried elements and offer a measure of safety unobtainable by any of the plans made public:

(*A.*) Surrounding the head of each high-level lock should be a receiving basin sufficient in area to hold, if it be found desirable, a plurality of vessels. Between this basin and the lake proper there should be a gate, which, in the event of the outflow of the waters of the receiving basin, will serve to hold back the waters of the lake. Between this, the lake-gate, and the head lock-gate there should be a system of interlocking devices acting so that neither gate may be opened until after the other has been closed. Thus, whatever damage may result to the lock system itself from a boat out of hand, the lake itself cannot flow out.

(*B.*) Each lock, of the series of three, should be two locks long; that is to say, double the necessary length of a single lock. Midway between the ends of each such lock there should be a lock-gate, of the usual construction, which I term a center gate. Thus, each double-length lock will be composed of two sections, both of which are simultaneously emptied or filled. Between the head-gate of a lock and its center gate there should also be interlocking connections so arranged that the center gate cannot be opened until after the head-gate has been closed, and *vice versa.*

In this system of lock a vessel from the lake will first be admitted to the receiving basin (probably with several others). The lake-gate of the receiving basin will then be closed and the head lock-gate of the high-level lock will thereafter be opened, when a vessel will be passed into its first section, after which its head-gate will be closed and its waters drawn off. The level of the first lock having fallen to that of the second lock both the center and foot gates of the first lock may be opened and the vessel permitted to pass into the first section of the second lock, whereupon the same order of operations may be gone through with respect to the second lock, and so with respect to the third.

If desired, and with as great safety, each lock may be used simultaneously to lower two full-sized vessels, each occupying one of its sections. Under these conditions the first vessel would enter the first section of the high-level lock, after which the head-gate of the latter would be closed. The vessel would then be passed into the second section of the high-level lock and the center gate thereof be closed behind it, whereupon the head-gate could again be opened and the second vessel passed into its first section, after which, the head-gate being again closed, both vessels could simultaneously be lowered to the second level.

Under this plan the various maximum damages which could result from the collision of a vessel with a gate or gates may be summarized as follows, it being borne in mind that the lake-gate is mechanically held closed while the head lock-gate is open, and *vice versa*: First, should a vessel entering a lock carry away its center lock-gate there would be no disturbance of the waters of the lake itself, and no resulting flood; therefore, the canal's damage would be confined to the gate itself and its surrounding works. Second, should the head lock-gate while closed be carried away by a vessel approaching it and the vessel arrested before reaching the center lock-gate, the latter being closed, the resulting damage would be confined to the head lock-gate and no flood would occur. Third, if both the head and center lock-gates were carried away, and the vessel arrested before reaching the foot lock-gate, the damage would be confined to the gates destroyed and no flood would occur. Fourth, taking what would substantially be the maximum possible mishap, should a vessel have sufficient headway to carry the head lock-gate, and thereafter, traversing the entire single lock-length of the first section without arrest, carry the center gate, and then should it still be able to traverse the full single lock-length of the second section, and carry away the foot-gate, then the maximum damage would occur which it would be possible to do the canal by such an accident—an outrush of the waters of the high-level lock, which would be followed by the waters of the receiving basin; but with the passage of these waters further damage would cease and the waters of the lake itself would remain undisturbed.

When examined in the light of such an accident, the double-length lock with center gate offers more than twice the resistance to a flood from above that would be offered by the single-length lock, because it would offer the resistance of two gates, center and foot, and of two sections of water at rest instead of but one.

If in connection with this system of locks, and of lock operation, the banks at either side were arranged laterally to fall away from the locks, leaving the lock masonry above the level of the surrounding earth to right and left, then the flood of water resulting from the bursting of a lock above and falling upon the surface of the lock beneath would largely pass off to right and left with less resulting damage to the lock itself.

If an additional safeguard were ever found to be necessary, two lake-gates set in tandem, a maximum ship's length apart, their mechanisms joined by interlocking devices, would place the works of the canal beyond the possibility of destruction by an outrush of the lake itself through the canal way.

Upon an analysis of this plan many advantages here unrelated will appear; and a careful consideration of the subject has led me to believe that a high-level canal built in conformity with it may be operated, so far as major accidents are concerned, as safely as one built at sea level.

The above, which I am taking the liberty of publishing, is respectfully submitted. H. A. Wise Wood.

December 8, 1906.

The Current Supplement.

The current Supplement, No. 1617, opens with the President's message to Congress on the conditions which he found at Panama. A very complete series of illustrations is given. Mr. J. M. Basford has an article on the motive power officer of a great railroad. During the last few years the steam turbine has formed the subject of many papers read before various leading institutions, and its different applications have often been referred to. Few of these papers possess more interest than that of the Hon. C. A. Parsons and R. J. Walker on the development of the marine steam turbine, published in the current Supplement. Prof. C. E. Munroe writes on the development in the explosives art in the United States during the last five years. Mr. W. R. Stewart contributes a very entertaining statistical article on the twentieth century pen. "The Preservation of Foods" is the title of an instructive *résumé* of modern processes. Teeming with much curious information is Mr. G. Bolin's essay on perturbations in locomotion, in which he describes how the normal movements of animals are affected by making lesions of the nerve centers and by unequally illuminating the two eyes. Written in a somewhat similar vein is Dr. Henry Fotherby's contribution on light and visual sense.

Micro-Chemical Detection of Copper.

Meerburg and Filipps (Pharm. Zeit.) say that copper can easily be detected under the microscope by means of cesium chloride, which gives with copper a double salt in the form of handsome red crystalline needles or prisms. These crystals are observable when only extremely small proportions of copper are present. If much cesium chloride be added, yellow crystals form, which become red on the addition of a little cuprous chloride. Cobalt somewhat affects the distinctness of the reaction; lead and bismuth are indifferent.

A German patent has been granted for a new process in spinning artificial threads made from cupric oxide and cellulose, and knitting the fabric for the mantles in the ordinary way. These mantles are subsequently impregnated with the thorium salts, and after drying are placed in a bath of ammonia, or hydrogen peroxide. This last bath is the essential point of the invention, as it converts the previously soluble salts into insoluble compounds, i. e., hydroxides. Since hydrogen peroxide only transforms the salts of thorium into an insoluble state, it is necessary to make use of a cerium bath, after the hydrogen peroxide treatment, in order to give the mantles the necessary one per cent of ceria.