MISCELLANEOUS.

(For the Scientific American.)

Those Forces.

The criticism of my article on motion, by Mr. J. B. Conger, requires a reply, for either he is or I am in a fog; and I do not wish to lead your readers astray, nor to wander in obscurity myself; and therefore place any person who corrects my errors in the list of my friends. But I have yet to see error in the present instance.

It is freely acknowledged that there is no essential difference between a force that produces uniform and another that produces accelerated motion. The difference is in the effects which forces produce, and the adjectives "constant" and "impulsive" were prefixed to the noun "force," in conformity with scientific usage, to distinguish between those effects. If Mr. C. throws a body, moving his hand with a uniform velocity while holding it fast, his hand exerts an impulsive force on that body; for it does not add any force or motion to the body, after the initial effort. But, if he increase the motion of his hand while it moves with the body, he exerts a constant force upon it, so long as the contact lasts —but the instant it leaves his hand, the body continues moving with a uniform velocity, which is equal to the final motion of his hand, and the distance the body passes over is found by multiplying the time of the body's motion by the distance it moves during a unit of that time, a second, for instance. Again, if a meteor were to fall from the sky toward the centre of the earth, through a space of 2,000 feet, and if, after it had fallen 1,000, impelled by the constant and accelerating force of gravity, the law of gravitation were suddenly annihilated, it would continue moving uniformly over the other 1,000 feet with the velocity it had acquired at the instant when gravitation ceased to act. In this case the meteor would be impelled by a constant force, producing accelerated motion through the first half, and by an impulsive force, producing uniform motion, during the second half of its course. Hence, the final velocity produced by a constant force may be regarded as the initial velocity of an impulsive force from the instant when the former ceases to act, because nothing is afterwards added, either to the momentum or to the velocity of the moving body, whose motion is thenceforth regulated by the law of inertia.

The velocity of a body moving uniformly may be found by either of the following theorems:—Divide the distance passed over by by the time of motion; or, divide the force which produced the motion; or the momentum of the moving body (which are always equal, because no body can communicate more force or momentum to another body than it possesses) by the weight or quantity of matter contained in that body. These are all the rules by which the velocity of bodies moving uniformly can be determined. I do not pretend to understand Mr. Conger when he says:—"Multiply the time of action, by its intensity into the mass acted on, and the velocity will result in all cases." The terms, "time of action" and "intensity," are not defined by any authorities within my reach; but, if by the former he means the time a motive force acts, and by the latter the amount of that force, as ascertained by the pressure a body of a given weight incumbent upon another, would exert —I do not hesitate to declare that his rule is utterly erroneous. Hutton's Mathematic, the New Encyclopædia Brittanica, and that of Edinburgh, give, each, all the possible combinations of formulæ relating to motion, both uniform and accelerated, and his rule is not found among any of them. The product of the velocity and weight (mass) of a body, is the momentum in all cases.

Between every two successive forces there must necessarily be an interval, else they are not successive, but one continued, a constant, force. Gravitation is, in this sense, a constant force, and so are water continually issuing from a penstock, and the wind striking the sails of a vessel with a uniform force. The bodies of solar systems move in a non-resisting medium, and I repeat, that if a body were thrown from the surface of one of these bodies, in the direction of a tangent to its surface, by an impulsive, or, if Mr. C. prefers the term, by a projectile force, properly proportioned to the respective quantities of matter (masses) contained in the two bodies, the one of least mass would become a satellite to the other; and, if the former moved in a circular orbit, its centrifugal and centripetal forces would constantly balance each; and the force with which it would strike a body in its orbit, would be equal to the difference between the projectile force and that with which it tended to recede from, or fall upon the central body. The reason why a person, whirling a body round his head with a string, must maintain a constant force upon it, is because it moves in a resisting medium, the atmosphere, and is at the same time drawn towards the centre of the earth by the unremitting force of attraction. Mr. Conger's idea to "leave the writer [me] to start a vessel to sail round the wind," is more witty than shrewd, indicating thought without reasoning.

Mr. Conger says, "there is no such force as centrifugal." Indeed! Then let Mr. Conger assign a reason why the secondary planets have not fallen upon their primaries long ago, and these, with them, upon their central suns. I agree with him that you can make nothing of it, for the simple reason that it is only a small part of the motive force which is necessary to produce circular motion, and without producing this, it could not be generated at all; and all that part of the motive force with which the body, moving in the circle, would strike an obstacle, is necessarily lost; for it is, I believe, only the centrifugal force which Mr. Andrews claims as his available motive power. All bodies are perfectly indifferent to motion or rest; so much so, that if any body could be placed in a position where it could be neither repelled nor attracted by any other body, it would always remain at rest; and, if it were then propelled in any direction, by any force, it would forever continue moving with the precise velocity it had acquired at the instant when the motive force ceased to act upon it. The Latin noun *vis* (force) prefixed to the anglicised noun inertia, is therefore perfectly inapplicable, and excellently calculated to lead the tyro Philosopher astray.

Mr. Conger says:—"So Esq. Andrew's machine is no humbug after all! Mr. Schetterly has given him all he wants—a force equal to that with which a body in circular motion strikes. For I understand him to suppose that the centrifugal and striking forces are equal; and as the striking force will always equal the impulsive force, whatever the amount of the centrifugal force is, must be clear gain—which we hand over to Esquire Andrews." Again: "If the sun should lose its attractive force, and the earth fly from its orbit with a velocity increased by the centrifugal force, how much faster would it move than it now moves in its orbit? Not any; for there is no such force as centrifugal,"—&c. I am almost surprised that a philosopher should heap together such a mass of groundless assumptions and jumpings at conclusions; and notwithstanding they are all impliedly confuted in my article on Motion, I proceed to gratify Mr. C. —not by estimating, but by calculating the centrifugal force, etc., in an assumed case, which will enable him to calculate in any other case, when the necessary data are given, and he will find that neither he nor I have an iota of motive force left to hand over to Esq. Andrews, after compensating him for the force necessary to maintain circular motion.

Supposing the earth were a globe without any eminences on its surface, and its diameter 41,774,000 feet, and that an iron ball, weighing two tons, were projected in a tangent to its surface, 16½ feet above the earth's surface, which is nearly the distance through which bodies fall near her surface, in one second; then, by multiplying the above diameter by the force of gravitation (16½ feet), and extracting the square root from the product, we have 25,920 feet, which is the distance through which the iron ball must pass every second in its orbit around the earth, so that the centrifugal force may exactly balance the centripetal (the force of gravity), and the iron ball become a satellite to the earth. Now, by a rule given above, the momentum (force) with which the ball would strike a body in its orbit, is to the momentum with which it would strike the earth's surface, as 51,840 is to 32 1-6; that is, the striking force in the orbit of the iron ball would be nearly 1612 times as much as its centrifugal force, omitting decimals; and the projectile force required to set the ball in motion, or with which it would strike a body in its rectilinear path, one second after the force of gravity was annihilated, would be equal to the sum of the two forces, i. e. 51,8716 1-2 tons. Where then is the force to be handed over to Mr. Andrews, seeing he must lose either the orbital or the centrifugal? Would it not be preferable to employ the former in the old way, and lose the latter? And even if he could employ both, he would get no more power, available to move machinery, than he must necessarily employ to set his force-generating machinery in motion, even if he could, God-like, obviate the passive but constant power of friction and resistance of the atmosphere. If "there is, no such force as centrifugal" created by inertia in circular and orbital motion, pray what was it that ruptured grindstones and heavy cast-iron balance wheels, throwing off pieces that demolished solid walls, in consequence of their too rapid motion? Perhaps Mr. Conger may still dispute the fact, that of two bodies of equal weight, and impelled by the same amount and duration of force, the one in a right line and the other in an orbit, the former will move faster than the latter. But he ought to remember that, in case of the weight and string, the hand exerts exactly as much force to retain the weight in its orbit, as the weight exerts to fly from it in order to move in a rectilinear tangental path; and that it is precisely in proportion to this force, that the orbital motion is restrained. I have carefully re-considered my article on motion, and find no error in it, except the omission of stating that when a body moves in an orbit, in a resisting medium, and is at the same time powerfully attracted by another body near it, as in the case of the string and weight, the projectiles and centripetal forces must both be constant; and that the two forces must act simultaneously and in angular directions.

Also, when of two bodies, one revolves around the other, in free space, the central one will contain the greatest quantity of matter; and both describe orbits, whose respective dimensions will be proportional to their respective orbits. But, in case of a wheel in motion; and even in case of a weight whirled with a string, the centre of motion is fixed. Though all these principles are necessarily involved in my article on motion, it seems some persons do not understand it. A man could not put a mill stone round his head, because a mill stone is heavier than he and would carry him off in a tangent.

I hope Mr. Conger will not be offended by my calling his attention to his own peroration.

H. R. Schetterly.

Howell, Mich., Feb. 21.

New Illuminating Apparatus for Lighthouses.

We learn by the Providence (R. I.) Journal, that Mr. George F. Wilson, of the Atlantic de Laine Mills, in that place recently gave an interesting lecture before the Providence Franklin Society, upon the Illumination of Lighthouses, in the course of which he explained an apparatus invented by himself and Dr. Meacham, of Cincinnati, which appears to be a most excellent invention. The improvement is a combination of the dioptric and catoptric methods of illumination. The lamp and reflector is thus described by the Journal:

"The lamp, which is of great illuminating power, has three concentric wicks, the diameter of the larger being two and three-fourths inches, with a separate oil chamber for each, and to which, by a simple arrangement of the conveying tubes, the oil is carried and constantly kept at its proper level, thereby dispensing with the rack-and-pinion for raising the wicks, as well as all the clock-work and pumps heretofore found indispensable in lamps of this kind.

The reflectors, which are arranged both above and below the light, are constructed upon a die, the form of which is obtained by the revolution of a parabola around an axis perpendicular to its own, and passing through its vortex; and the diameter of the lamp and the focal distance of the reflectors are so graduated to each other, that the most luminous portion of the light shall always be in this universal focus.

To prevent the escape of any radiant light, a cylindro-plano-convex lens, having the same common focus, is placed between the middle and lower reflectors, which transmits and refracts it in a line parallel to a horizontal plane passing through the light. By this arrangement all the light evolved is thrown out in a horizontal belt, and is equally luminous or brilliant at all points. The whole apparatus, which pleases all who have seen it by its exceeding simplicity, will not cost more than $300; and while it would produce a light many times more efficient than the best catoptric apparatus now in use, it would save to our government more than $100,000 annually."

On the Separation of Silver.

In a recent communication made to the Academy of Sciences of Paris, MM. Malaguti and Durocher show that all the metallic sulphurets and arseniurets, properly so called, decompose a certain quantity of chloride of silver. This decomposition is effected more or less slowly when the contact is made with dry salts, but it is accomplished more rapidly, and in some cases even instantaneously, when the chloride or bromide of silver is in solution:—

100 parts	sulphuret of zinc		decompose	3 chloride of silver
"	"	cadmium	"	14 do.
"	"	bismuth	"	2 do.
"	"	lead	"	5 do.
"	proto-sulphrt.	tin	"	1⅓ do.
"	bisulphuret	tin	"	30 do.
"	proto-sulphrt.	copper	"	360 do.
"	arseniuret	antimony	"	120 do.
"	"	cobalt	"	166 do.

All pure metallic sulphurets possess the property of decomposing, under determinate conditions, a given quantity of chloride of silver, and even other insoluble chlorides. This property appears to be modified in certain cases by the molecular state of the substances. The decomposition of the chloride of silver may be effected by double decomposition, by reduction, or by reduction and double composition together.

Mammoth Steamers.

We see it stated in the London Times, that a proposition is on foot to build iron steamers of 720 feet in length, 90 feet beam, and 36 in depth, with four engines of 1,000 horse-power, and a screw, whilst there will be eight masts, with huge latteen sails. The vessels are to be built of iron, and will be not only shot but fire proof, and, from the novel method, though simple, and for strength known to every schoolboy, their immense length renders them more safe than those of smaller construction. It is calculated to carry 2,000 passengers, with a theatre for amusements, &c., and could, in case of war, open a battery of 300 guns. This projected scheme is for the purpose of bringing the English colonies within a month's reach of London, but it is altogether too large an affair. The only short way of bringing England's colonies nearer to London, is to give them the best system of government possible for their interests.

Building Associations.

It is supposed that there are no less than 100 building associations in the cities of New York, Brooklyn and Williamsburg. These associations have enabled many working men to build houses for themselves, which otherwise they would not have been able to do. They are good objects for the amelioration of the condition of working men.

Notice---Communications.

We receive a great many communications on the one subject, the majority containing nearly the same ideas; we can only publish one or two of such. We have frequently such a pile of communications on hand that we cannot, for some time, give place to those we have set aside for publication. The communications which come to us, are not like those which frequently come to the mere newspaper, which, from their nature are treated with disrespect—our communications are all respected.

No antidote is known for the poison of mushrooms; an emetic is all that is prescribed with any hope of success; if early administered it may do good.