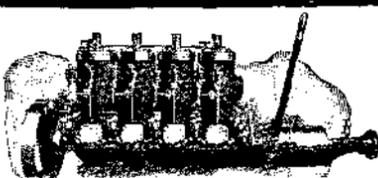


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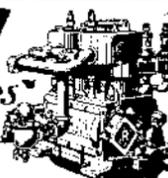
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Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication.
References to former articles or answers should give date of paper and page or number of question.
Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research and though we endeavor to reply to all either by letter or in this department, each must take his turn.
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Scientific American Supplements referred to may be had at the office. Price 10 cents each.
Books referred to promptly supplied on receipt of price.
Minerals sent for examination should be distinctly marked or labeled.

(9894) F. G. H. asks: Will the range (actual and theoretical) of a 30-caliber bullet (any other caliber probably would not matter) fired from a gun weighing ten pounds suspended by a wire, i. e.—free to recoil without friction—be the same as a bullet of the same caliber fired from a gun having an equal bore and similarly suspended, but having a weight or mass of 10,000 pounds? This has puzzled the writer and a number of his friends who are readers of your valuable paper. Any light you can throw on the subject, together with explanation of how you arrive at the correct solution will be greatly appreciated. A. Newton's Third Law of Motion is, "The mutual action of two bodies is equal and opposite in direction;" or, as it is usually expressed, "action and reaction are equal and opposite in direction." The action of the gases upon the gun and the ball are equal in quantity, and each has the same momentum, the ball forward, the gun in the opposite direction. No account need be taken of the weight of either unless the velocity of the two need be determined. The velocity of recoil of the guns will be in proportion to their weight.

(9895) J. K. asks: How cold is it when it is twice as cold as two degrees above zero? The above problem appeared in a publication recently, which caused considerable discussion. Some considered it as a joke, and others more serious. Following issues published different solutions. If I may be permitted to trespass upon your time, please favor by answering the above problem if possible. A. It is not twice as cold when it is one degree above zero, F. as it is at two deg. above zero. To get an absolute comparison of temperature we must measure from absolute zero. Temperatures above absolute zero correspond to the heat required to produce them. Two above absolute zero is twice as hot as one above. Absolute zero is 459 deg. Fahr. below its zero. The real temperature when the Fahr. thermometer shows 2 deg. above is 461 deg. absolute Fahr. Twice as cold, or as it should be expressed, half as hot as this, is 230.5 deg. absolute Fahr.

(9896) S. R. says: I have a maximum and minimum thermometer, the principle of which I find it difficult to understand, and so far have not been able to find any description in any books that I have. It is the bent tube thermometer, containing quicksilver, but with no bulb as a reservoir of the metal. It carries two glass rods with iron pins in them, which mark the maxima and minima, and which are drawn back to place by means of a small horseshoe magnet. A. The thermometer which you describe is a Six's thermometer. The liquid is usually the same on both sides of the mercury, and is usually alcohol. A space above the alcohol in the bulb has in it only vapor of alcohol. When the temperature rises, the expansion of the alcohol in A pushes the mercury and the iron wire above the mercury in B along to the highest point reached by the mercury. When the temperature falls, this wire is left at the highest point it has reached, the alcohol contracts in A and draws the mercury over to the side A. The iron wire is not pushed in front of the mercury in A to the lowest temperature reached by the contraction of the alcohol in A. The thread of mercury is the indicator; the change of volume of the alcohol measures the change of temperature.

(9897) W. A. W. asks: Can it be proved that light is not electrical energy generated by the sun, which energy in coming in contact with the resistance of the earth's atmosphere produces light by friction? Does the wireless telegraph operate through waves of ether or waves of air? A. Scientists believe that light is due to the same waves as electricity, and that these come through space, from any body which can produce them, to the earth. When these waves strike the earth, they are ultimately absorbed as heat waves. If they strike an eye, they are converted into light waves. Any object which is hot enough can emit such waves. Objects which can reflect these waves may send them to the eye, as flowers and other visible objects on the earth do send them. Friction is not involved in the action. Wireless telegraphy is performed by waves which are electro-magnetic in character, and which pass through air or ether on their way, supposedly with the speed of light.