

apparatus will operate to prevent head-on as well as rear-end collisions, and the devices employed are entirely automatic in their operation.

CAR-RAIL AND BED.—R. JACKSON, Kennett Square, Pa. The objects in this case are to provide a rail having the maximum amount of wearing surface for the minimum weight, and to provide a rail bed which is not subject to decay and to which the form of rail may be readily applied. A further object is to provide a rail and bed in which additional parts for securing the ends of the rails together are unnecessary and in which only ordinary fastenings need be applied at the ends or into intermediate portions of the rail.

RAIL-JOINT.—J. C. ABBOTT, Pittsburg, Pa. The object of the invention is to provide railroad rails with an improved form of joint whereby their meeting ends are firmly yet detachably connected without the use of fish-plates and bolts or other form of fastening independent of the rails themselves. The joint may be cheaply produced for manufacture.

Pertaining to Vehicles.

DUMPING-WAGON.—R. A. SHOWERS, Shenandoah, Iowa. The objects among others in this invention, are to provide a wagon operated by the driver without shifting his position to carry the body of the wagon, together with its load, rearwardly and inclinedly rest it at the required point of discharge; also to provide means for releasing and unlocking the tail-gate of the wagon from the driver's seat.

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Notes and Queries.

HINTS TO CORRESPONDENTS.

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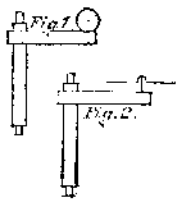
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(10518) A. H. C. asks: I have a small dynamo—12-volt—which runs easy enough when the current is open, but as soon as the current is closed it runs so hard as to be nearly impossible to keep in motion. I suppose this is due to magnetic attraction. Can you suggest a remedy? A. Your dynamo is all right. It ought to run hard when doing work. When no current is flowing, there is no resistance to motion, and of course the shaft turns with ease. No current is being generated. When current is being used, work must be done to furnish the current. The power required to light ten 16-candle-power lamps is equal to that of one horse. A man might be able to furnish a tenth as much for a while. You only say that your dynamo current has 12 volts pressure. This does not tell anything about the current. Had you also given the amperes, we could have given you the power needed to drive the machine at full speed.

(10519) D. H. asks: If a convex piece of ice could be frozen clear enough, not to scatter the rays of the sun, so as to come to a focus, will not the ice produce the same effect as a sun glass? If so, if some material that will ignite where the rays of light focus, is not the heat produced by the gathering and focusing of the rays produced by the convex surface caused by the sudden stopping of the rays, or do the heat rays actually pass through the ice? If the theory is void that the heat of the sun is produced by the stopping of the rays when they strike the earth, why would not the heat be spent by passing through the atmosphere before they reach the earth? A holds that heat from the sun is produced by the stopping of the rays of light. B holds that the rays give off the heat as it passes through the atmosphere. Which, if either, theory is correct? If neither is correct, will you please state correct theory, as to how the heat is given off. A. If a lens, or sun glass, as you call it, were made of ice, it would bring the rays of the sun to a focus, and the focus would be hot just as it is when a lens of glass is used. Lenses of ice have frequently been made. The heat rays of the sun pass readily through ice and glass, just as they do through the air. How could the air of a room be warmed by the sun, if the heat of the sun did not pass through the glass of the windows? Nor is the heat, which we can so easily feel when the sun shines upon us, lost in the air or in the space between us and the sun. The atmo-

sphere of the earth absorbs a part of the heat of the sun, but the greater part comes through to the surface of the earth and warms it. The heat of the sun is produced in the sun, and comes to the earth from the sun. The earth stops the rays, or waves, as they would better be called, and makes them sensible to our nerves. It is true that the heat of the sun would not be felt here, if there were no earth for them to strike. The rays would go on till they found something to intercept them, before they could be made evident or manifest.

(10520) W. M. B. writes: It seems to me that in your reply to Query No. 10424 you ought not to say that the moon revolves on its own axis. Of course, it is only a question of the proper expression, as everyone is agreed as to the facts. It would be just as proper to say that the Platiron building in New York revolves on its own axis as to say that the moon does. Both would appear to revolve in precisely the same way if seen from some point in space. The axes of both revolutions are the center of the earth. But of course if your statement is correct, I shall have to admit that my head revolves on its own axis, which may account for my waking up some morning with a lame neck. A. Several esteemed correspondents have taken exception to the statement that the moon rotates on its own axis. One has written us four letters on the matter. We make an additional note on the subject. No, it is not proper to say that the moon revolves on its own axis; nor did we say that it did. The friend of our correspondence who sent in the question said it in the words quoted, and we cannot be held responsible for that. Revolve is strictly limited in astronomy to the motion of a heavenly body in an orbit. The earth revolves around the sun. Rotate is limited to a motion around an axis. The moon rotates on its axis. Our correspondents who object to our answer do not seem to know the usage of these words in astronomy. Now, a final word on the subject. The sun rises on every point of the moon, passes over the planet, and sets once a lunar month, just as it does on the earth every day. If this does not show a rotation on an axis respecting the sun and all outside space, we fail to understand simple motions. We will quote an authority than whom there is no



higher, Prof. C. A. Young, "College Astronomy," "Rotation of the Moon," Sect. 248: "The moon rotates on its axis once a month, in precisely the same time as that occupied by its revolution around the earth. In the long run it therefore keeps the same face toward the earth. It is difficult for some to see why a motion of this sort should be considered a rotation of the moon, since it is essentially like the motion of a ball carried on a revolving crank. See Fig. 1. Such a ball, they say, revolves around the shaft, but does not rotate on its own axis. It does rotate, however. The shaft being vertical and the crank horizontal, suppose that a compass needle be substituted for the ball, as in Fig. 2. The pivot turns underneath it as the crank whirls, but the compass needle does not rotate, maintaining always its own direction with its marked end north. On the other hand, if we mark one side of the ball in Fig. 1, we shall find the marked side presented successively to every point of the compass as the crank revolves, so that the ball as really turns on its own axis as if it were whirling upon a pin fastened to a table. The ball has two distinct motions by virtue of its connection with the crank: first, the motion of translation, which carries its center of gravity, like that of the compass needle, in a circle around the axis of the shaft; secondly, an additional motion of rotation around a line drawn through its center of gravity parallel to the shaft. A body rotates whenever a line drawn from its center of gravity outward, through any point selected at random in its mass, describes a circle in the heavens." We leave the subject with this quotation.

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