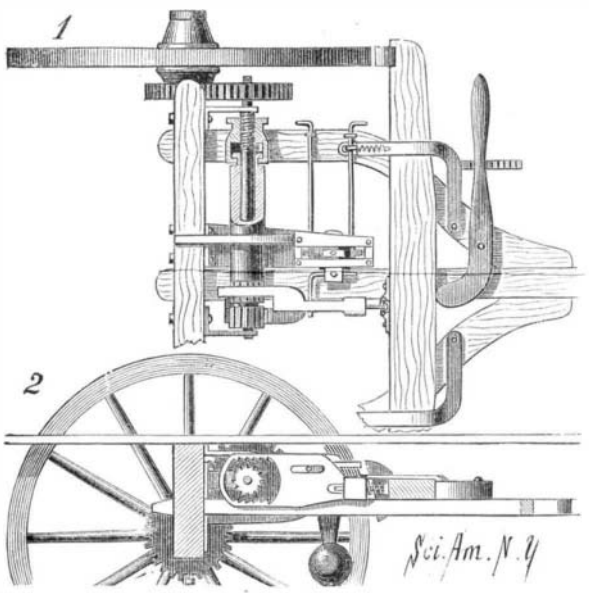
AN AUTOMATIC WAGON BRAKE.

Fig. 1 is a plan view, and Fig. 2 is a vertical section of an automatic wagon brake invented by Messrs. Minor Cartmell and Nelson Bayless, of Urbana, Ohio. Attached to the hub of one hind wheel is a gear wheel, which engages in front of it with a wheel on a tapering shaft carrying a barrel correspondingly tapered to fit snugly on the shaft. On the opposite end of the shaft is a ratchet wheel, and on the like end of the barrel is another ratchet wheel; the teeth of these wheels run in opposite directions to one another. The frictional hold of the barrel on the shaft is regulated by means of a nut. A slotted drawbar having reversely arranged ratchet teeth on its upper and lower jaws is arranged to engage with the ratchet wheels on opposite sides of the shaft and barrel. The brake beam is connected with the drawbar by an adjustable coupling pin. When the wagon is on a level, the teeth on the upper and lower jaws of the drawbar do not engage with either of the ratchet wheels; and the drawbar is held in such position by a weighted pendulum.

When the wagon is traveling forward, the shaft has a backward rotation; and when the wagon strikes a down grade of sufficient declivity, the pendulum swings forward and a crank on the shaft to which the pendulum rod is attached drops the drawbar into engagement with the ratchet on the barrel, which draws the brake beam with its shoes against the wagon wheels. When the wagon passes to a level, the pendulum swings back to an extent that, by the aid of the crank, disengages the upper jaw of the drawbar from the ratchet on the barrel, but not sufficiently to engage the lower jaw with the ratchet on the shaft. Suitable springs act upon the brake beam to remove its shoes from the wheels. When the wagon strikes an up grade, the pendulum swings back far enough to cause the crank to raise the drawbar, so that the teeth on its lower jaw mesh with the ratchet on the shaft; but, owing to the direction of motion of this ratchet and the arrangement of its teeth, the ratchet will slip over the teeth on the jaw, and fail to operate the drawbar until the wagon stops and makes a slight backward movement, when the shaft, revolving forward, draws the brake against the wheels. The forward motion of the wagon again releases the wheels. By adjusting two cut-offs which limit the swing of the pendulum, the wagon can be backed on either an up or a down grade. When the wagon is passing over light grades, or when the roads are heavy, the mechanism can be adjusted so that the brake will not act. A hand lever is provided for locking the wagon when on a level, should the driver desire to leave his team untied. This wagon brake accomplishes all the work required of such a device, and in its control of back action is of much value on long grades when applied to heavily loaded wagons, as the driver can rest his team whenever necessary. As the brake is carried by the running gear, its working is not interfered with by the removal of the wagon box. The brake is simple, and can be strongly and durably built.



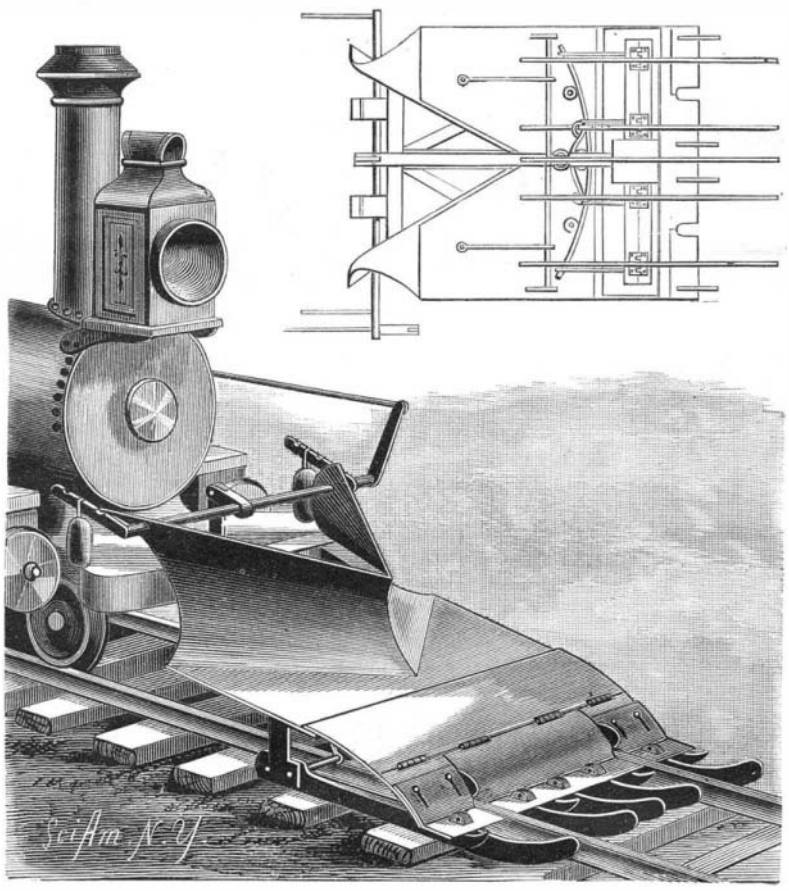
CARTMELL & BAYLESS' AUTOMATIC WAGON BRAKE.

Spontaneous Combustion from Coal Dust.

The conclusion has been reached by M. Fayol that the absorption of atmospheric oxygen by coal dust usually produces the rise in temperature to which spontaneous combustion is due. He finds that lignite is ignited at the low temperature of 300 deg., anthracite at 575 deg., and other varieties of coal, in powdered form, at intermediate temperatures.

AN IMPROVED SNOW PLOW.

The engraving represents a snow plow adapted especially for use in clearing railway tracks, although it may also be used for clearing paths over common roads. The plow is made with concave mould boards, joined at their forward ends and diverging backward, and secured to a platform which inclines downward and forward, and has a square end; these parts are supported by a frame of wood or iron bars connecting the plow to the front of a locomotive, or the front of a traction engine or wheeled vehicle when common roads are to be cleared. The rear part of the shovel plate is bolted rigidly to a bar of a frame supported by the bed plate, so that its rear end overlaps the forward end of the bed plate; and the front shovel plate —preferably made in three sections in a railway snow plow—is hinged to the forward edge of the rear plate, and rests upon the front bar of the frame. To a series of arms projecting backward from the rear bar of the frame is fixed a curved bar (shown in the inverted view of the plow), which bears against guide and anti-friction rollers. With this construction the shovel plates and frame are supported by the bed plate, and are at liberty to turn bodily to either side as the curved bar moves over the rollers, to allow the machine to turn curves more readily without damage to the plow runners. The forward ends of the runners are pivotally connected to the front edge of the forward shovel plate by pins; the rear ends of the runners have slots through which passes a rod held at both ends in hangers fixed to the bed plate. One or more of the central runners have their slots open at the back ends; this allows these runners to be removed, as may sometimes be necessary when the ballast is high at the center of the track.



WACKERMAN'S IMPROVED SNOW PLOW.

To the outer edge of the forward shovel plate, at points between the runners, are fixed upwardly curved guard bars, which serve to lift the shovels above any obstacles that may chance to lie in the path of the plow between the runners, and that would not be struck by the runners. The rails enter slots made in the shovel plate. The forward shovel plate is made in three separate sections, to allow of independent movement as the various runners meet inequalities of ground or tie surface along the road or track; and to allow the outside runners to be lifted higher at the forward ends than the inner runners, so as to meet and pass over considerable inequalities on the ends of the ties, and also to allow vertical adjustment of the end sections above the center one when it is desired not to cut down the snow quite so close to the ties at the outside of the rails. The end shovel sections are made with two plates held to each other by screws passing through slots. Fixed at the opposite ends of the central section are cutters which make a clean cut through the snow along the tops of the rails. When intended for use on common roads, the shovel plate may be made in one piece and without the rail slots and cutters.

A transversely ranging shaft journaled in the rear upper part of the mould board is so connected with the shovel plates and plow runners as to lift them when it is turned by means of a rod extending from a crank arm at one end of the engine cab. This shaft is also provided with arms carrying weights, which serve to counterbalance the weight of the shovels and runners. It will be seen that the mould board can be so made as to throw all the snow to either side of the track, or to divide it evenly, as represented in the engraving. All the parts of the plow are simple, and are so arranged as to facilitate repairing; the machine can be strongly and durably built.

This invention has been patented by Mr. Joseph Wackerman, of Warren, Pa.

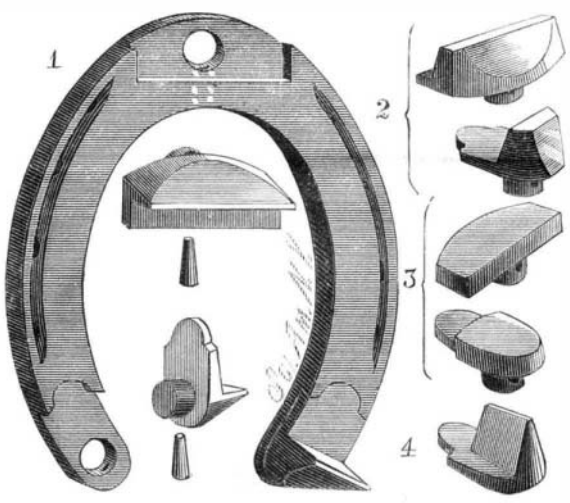
Loads on Roofs.

The load to which a roof is exposed is of two kinds: first, that due to the weight of the materials; and second, that due to the wind, or its vertical pressure. The first increases with the span, and must be estimated from tables of the weight of the materials used. In the second category the vertical component of the wind has to be considered, calculated about 40 lb. per square foot. For ordinary roofs the following data have been given per square foot: 5 lb. for weight of truss, 5 lb. for purlines, etc., 10 lb. for slate, and 36 lb. for wind, making a total pressure of 56 lb. or ½ cwt., about 1-40 ton per square foot. For very large roofs these figures ought to be increased, and we may usefully refer to the figures used for the St. Pancras station roof, as given by Mr. Barlow. Here the total estimated pressure, exclusive of the weight of truss, was taken at 80 lb. per foot, and this was made up as follows:

The truss, 10 lb. per square foot, covering 36 lb., wind 34 lb. The calculation of the strains can be obtained by analytical or graphical means, both of which methods are described in handbooks which treat of these matters. It is convenient to suppose this total load concentrated at certain points, such as the foot of rafter, the apex of roof, and a point midway between. Whatever the weight may be on each rafter, half of it will be discharged at each of the two extremities if we regard it as a rigid beam. But if we divide the length, the middle or purline point will receive double the share of weight discharged at the feet. There will, in fact, be equal weights at the apex and the purline point, but half only at the feet of rafter. In short, at the apex and purline point the loads are doubled, owing to the bearings of two adjacent lengths coming together. Thus, if we put five at the feet of rafter, we must put ten at the purline point and ten at the apex of roof.—*Building News.*

AN IMPROVED HORSESHOE.

In the horseshoe herewith illustrated, the calks are made detachable and interchangeable, the object being to simplify and strengthen the construction. The body of the shoe is made in any preferred form, and is provided with nail holes, so as to be attached in the ordinary manner. The toe calk fits in a recess formed in the under surface of the toe part of the shoe; a lug upon the inner side of the calk enters a hole made through the shoe. The calk is held firmly in place by a pin passing through a hole in the shoe (shown by the dotted lines in Fig. 1) and entering a hole in the lug. The heel calks are secured in a similar way; the shape of these calks and of the recesses they enter is clearly shown in the engraving. The small figures show calks of various shapes. It will be seen that by the use of these calks—which may be easily and rapidly changed to suit the weather—the horse may always be correctly shod. All wear comes upon the calks alone, thus requiring less frequent trips to the blacksmith shop. The facility with which the change from smooth to sharp, or sharp to smooth calks can be made not only saves time and expense, but also does away with the necessity of making new holes in the hoof each time the shoe is changed. This invention has been patented by Mr. A. L. Stevens; particulars can be had from Mr. J. W. Daskam, general agent, Stamford, Conn.



THE STEVENS PATENT HORSESHOE.